MINING WORLD

Merry Christmas

In this issue

Uranium Mining Goes Deeper

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MECHANICAL LOADING FROM DRAWPOINTS

EIMCO

YOU CAN SAVE time ... you can increase production ... you can improve safety ... by using Eimco RockerShovels in drawpoints. We have published a number of job stories describing drawpoint loading at various properties. Write for your copies of L1017A, B, and C Bulletins.

THE EIMCO CORPORATION
Salt Lake City, Utah, U.S.A.
Export Office: Eimco Bldg., 52 South St., New York City

DECEMBER 1954

VOL. 16 No. 12

One of approximately 1200 on the Minnesota Iron Ranges, this 34-ton "Euc" is loaded by a 5 cu. yd. shovel at a large open pit operation. Rear-Dump models are available with semi-rigid or spring mounted axles, Allison Torqmatic drives and transmissions, or conventional 5 and 10 speed transmissions.

More Profit with "Eucs" in Mines and Quarries

■ Built for tough off-the-highway service, Rear-Dump and Bottom-Dump "Eucs" and Euclid Scrapers are cutting the cost of moving ore and overburden, sand and gravel, and stone on quarry and mining operations. Big payload capacity, fast travel speed and high job availability add up to more loads per hour and lower cost per ton or yard hauled.

■ Your Euclid Distributor will provide a hauling production and cost estimate for your operation . . . there's no obligation so get in touch with him soon. Have him show you how Euclid equipment can improve your profit picture.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

This Bottom-Dump "Euc" is being loaded with 17 cu. yds. of sand and gravel from an overhead hopper for haul to the washing plant. Owner is Interstate Sand and Gravel of Covington, Ohio.

Ideal Cement Co. of Portland, Colorado uses 22-ton Rear-Dumps with quarry bodies to haul stone from the face to the crusher. Top speed of this Model 36 TD, with full payload, is 32.5 m.p.h. Spring mounted drive axle and Allison Torqmatic drive and transmission are important factors in stepping up production and profits at this quarry operation.

Euclid Twin-Power Scraper stripping overburden at a large gypsum quarry in Iowa. Powered by two 190 or 200 h.p. engines with torque converters and semi-automatic transmissions, this "Euc" self loads, has a struck capacity of 18 cu. yds. and travels up to 30 m.p.h. with full payload.

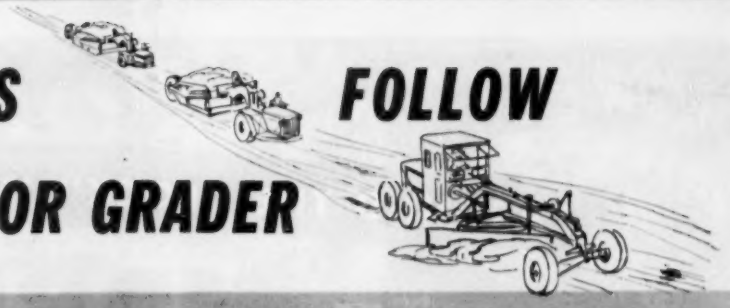
Cable Yuklid—Code Bentley

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

HEAPING LOADS FOLLOW THIS CAT* MOTOR GRADER



A bad haul road can slow down fast hauling equipment. There's no such problem at this copper pit in Kimberly, Nev. A Caterpillar No. 12 Motor Grader is on the job keeping hauling equipment working efficiently.

Four million tons of overburden are being stripped. Six DW21s wheel along a half-mile haul road 20 hours a day. They carry big loads *fast* because the No. 12 travels 30 miles a day smoothing out rough spots. Costs per load drop, profits rise.

Like so many mining operations, this is a *Caterpillar team job*. Besides the motor grader and the fleet of DW21s, three D8s are on the job.

Economy-minded mining firms have found it wise to standardize on big yellow machines. Their operators become familiar with one make of equipment. This benefits owners with bigger production — lower maintenance costs.

Mechanics, too, are able to do a bigger day's work. They get to know one make of equipment. Many Caterpillar parts are interchangeable. Grease, oil and fuel are the same — all Cat Diesel Engines operate on ordinary No. 2 furnace oil without fouling.

Finally, you get the benefit of quick, efficient, one-stop service from one dealer — your Caterpillar Dealer.

Any Caterpillar-built machine builds profits. With a fleet of Cat equipment your profits go up. See your Caterpillar Dealer soon. Talk to him, inspect the equipment, and then have him demonstrate it on your job!

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U. S. A.

CATERPILLAR*

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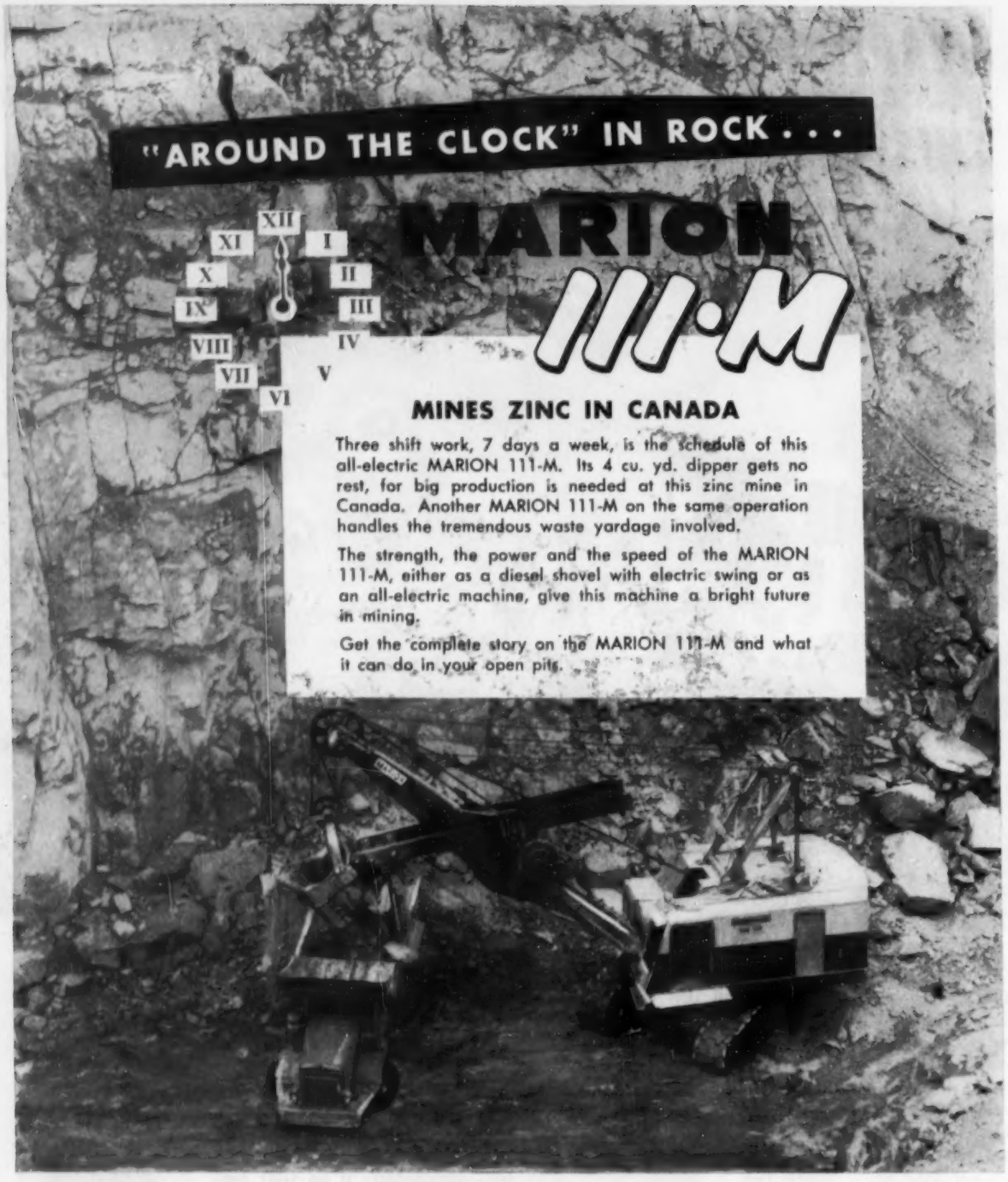
NAME THE DATE... YOUR DEALER WILL DEMONSTRATE


"AROUND THE CLOCK" IN ROCK . . .
MARION
111-M
XII
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
MINES ZINC IN CANADA
Three shift work, 7 days a week, is the schedule of this all-electric MARION 111-M. Its 4 cu. yd. dipper gets no rest, for big production is needed at this zinc mine in Canada. Another MARION 111-M on the same operation handles the tremendous waste yardage involved.
The strength, the power and the speed of the MARION 111-M, either as a diesel shovel with electric swing or as an all-electric machine, give this machine a bright future in mining.
Get the complete story on the MARION 111-M and what it can do in your open pits.

MARION POWER SHOVEL CO.

MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES

from 1 to 60 cu. yds.

IN ALL PRINCIPAL CITIES

OSGOOD-GENERAL, a subsidiary, manufactures excavating machines from ½ to 2½ cu. yds., truck cranes from 15 to 25 tons, Mobilcranes from 25 to 45 tons, and log loaders.

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

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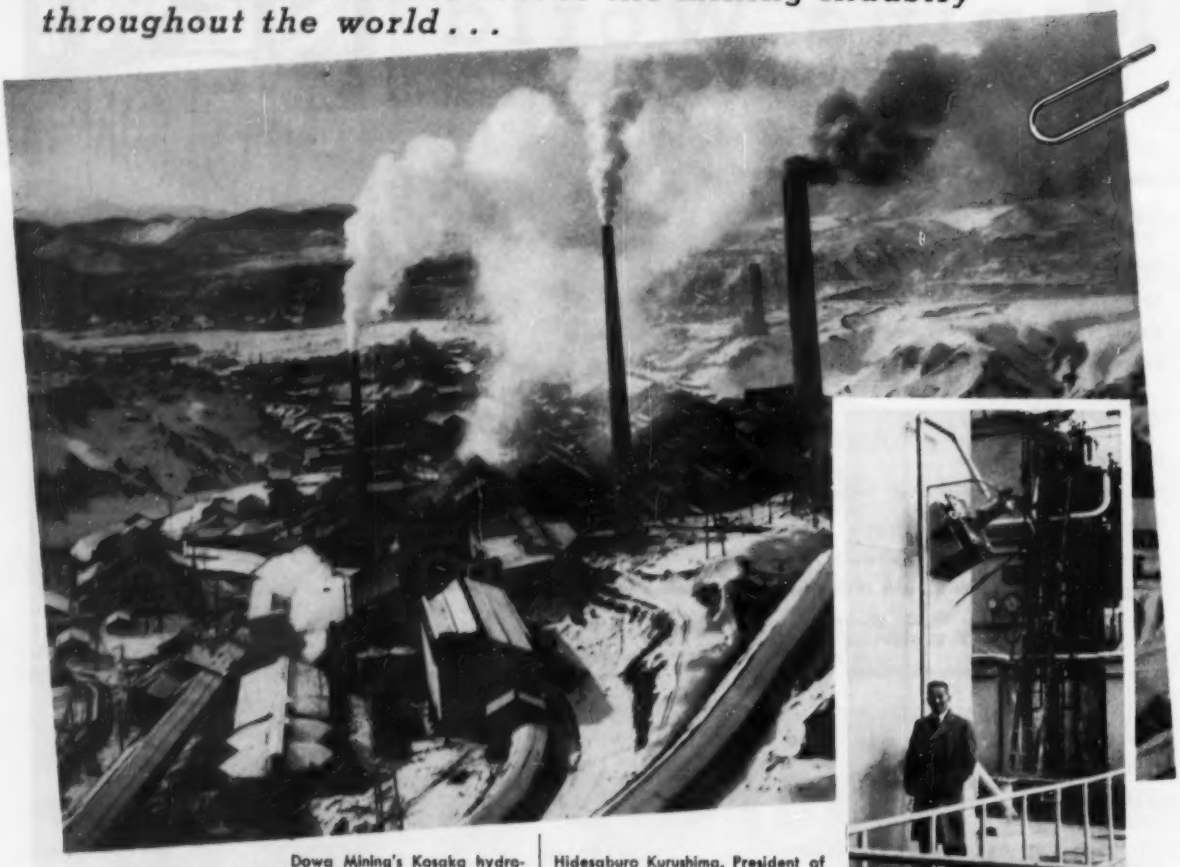
How Dorrco Worldwide serves the mining industry throughout the world . . .



Dowa Mining's Kosaka hydrometallurgical plant where FluoSolids roasts 83 metric tons of complex copper-zinc concentrates per day.

Hidesaburo Kurushima, President of Dowa Mining Co., beside the Reactor in the FluoSolids section of the plant.

FluoSolids – key to copper-zinc extraction from a single electrolyte in Japan . . .

Dowa Mining Company's Kosaka, Japan, hydrometallurgical plant represents the world's first successful roasting of copper and zinc with electro winning of both metals. The Dorrco FluoSolids System — coupled with a war-born electrolyte recovery process — made this economically sound innovation possible.

Collaborating on the project with Dowa engineers were our research, design and engineering staffs in the United States and our Associates in Japan, Sanki Engineering Co. Ltd. of Tokyo. Manufacture of the FS Reactor and a number of components in Japan, with the auxiliary equipment furnished from the U. S., proved to be most advantageous to Dowa.

This is but one example of how the flexibility of the Dorrco Worldwide engineering organization has worked to the advantage of a client. It can work for you too, through any of the following Associated Companies and Representatives, all with facilities for local manufacture.

FluoSolids is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

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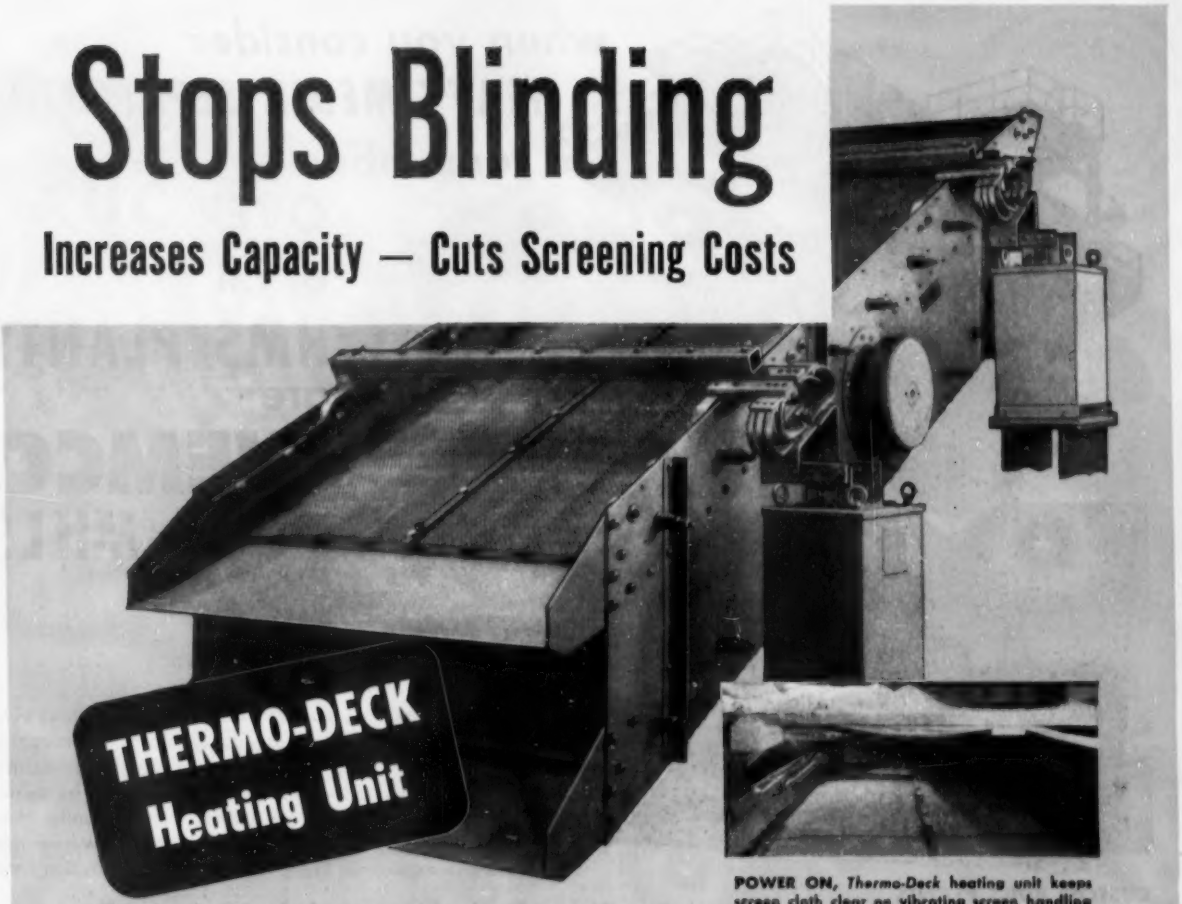
Stops Blinding

Increases Capacity — Cuts Screening Costs



You can screen fine, moist material *continuously* with a *Thermo-Deck* heating unit. No down time required to clear fine or medium mesh screen cloth!

Heated screen cloth remains open . . . you get *more* tonnage through the screen and better separation.

Operating records prove that heated wire cloth screens last up to three times longer than non-heated cloth, because they do not have to be pounded free of blinded material. For the same reason, you save man-hours too. These lower costs increase your profits.

The *Thermo-Deck* unit can be applied to Allis-Chalmers screens in the field. See your nearby Allis-Chalmers representative for complete details. Or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 07B7812.

A-4272

POWER ON, *Thermo-Deck* **heating unit keeps screen cloth clear on vibrating screen handling fine, moist material.**

POWER OFF, troublesome blinding occurs. This view shows same screen as above, with *Thermo-Deck* unit shut off.

For Intermittent Feed... ADD A *STA-KLEEN* DECK

If feed is intermittent, fine material may bake on the wire cloth during interruptions in feed. Heat which ordinarily is absorbed by moist material increases the temperature of the wire cloth sufficiently to cause any fine material to bake on. The addition of a *Sta-Kleen* deck effectively prevents this. Bouncing rubber balls between the screen cloth and a ball retaining deck clear the cloth of baked-on particles.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

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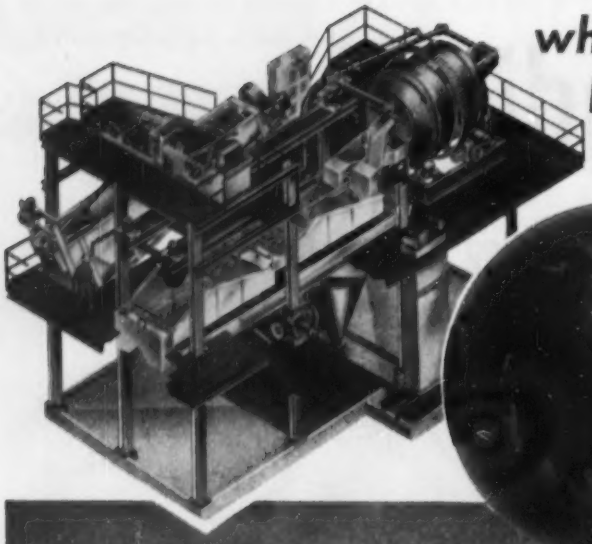

when you consider HEAVY MEDIA SEPARATION remember:

OVER 50% of all HMS PLANTS are WEMCO MOBIL-MILLS

Approximately 185 Heavy-Media plants have been placed in operation or are under construction throughout the world. Of these, 100 are Wemco Mobil-Mills located in 18 states and 15 foreign countries and having an aggregate rated capacity of **50 million** tons annually. Here is remarkable proof of Wemco's design know-how and extensive experience in the Heavy-Media Separation field.

Consistent, economical concentration of ores amenable to Heavy-Media Separation is offered by the Wemco Mobil-Mill. The superior design of this unit gives accurate control of media density and positive sink removal. It assures higher grade concentrate and lower tailings with operating costs as low as 15 cents per ton of feed. A partial list of ores being efficiently treated by Wemco Mobil-Mills includes:

LEAD	COPPER	MANGANESE
ZINC	DOLOMITE	COAL
IRON	BARITE	AGGREGATES
FLUORSPAR	BRUCITE	DIAMONDS

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Wemco's extensive engineering and equipment experience is your assurance of our ability to design and install complete custom built beneficiation plants for any type mineral amenable to concentration by Heavy-Media Separation.

RENT OR PURCHASE WEMCO MOBIL-MILLS

Take advantage of Wemco's rental, rental/option to purchase, or outright purchase plans.

Write today for Bulletin M-3-M-5 and further information on the use of Mobil-Mills in mineral engineering practices.

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators
Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units
Fagergren & Steffensen Flotation Machines • S-H Classifiers • Attrition Machines
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Check these important MOBIL-MILL features

- Prefabricated, ready to install.
- Fast installation at the plant site.
- Minimum initial and operating costs.
- Clean separation, higher recovery.

Mobil-Mills are furnished in five basic sizes and several models with smaller or larger plants varying in capacity from 5 to 275 TPH. Each plant is equipped with a choice of one of the following type separators to meet your particular requirements:

1. **WEMCO SINGLE DRUM** gives positive sink removal and efficient control of media density for one stage separation over a wide range of size fractions.
2. **WEMCO TWO-COMPARTMENT DRUM** gives two stage separation in a single unit for treating ores having a middling component.
3. **WEMCO CONE SEPARATOR** gives efficient, low cost separation with ores where a finer range of feed sizes requires greater volume of medium.

ROCK RATED

to better your best production!

Pit a P&H 1055 against any comparable 3½ yd. machine and see how P&H takes over the production lead. And it *maintains* the pace day after day, under the toughest digging and loading conditions!

P&H years-ahead design and construction make the big difference. You get the extra strength of high-tensile alloy steels to withstand the pounding of repeated shock loads . . . the solid stability that lets you exert more power at tooth point. And only P&H has *Magnetorque* to swing you through five loads to the other man's four. It's the most dependable swing ever built — lasts the life of the machine!

Want the same outstanding features in a 2½ yd. machine? Ask us about the companion Model 955A.

with P&H *MAGNETORQUE** ELECTRIC SWING

- **15-25%** *faster* . . . . . .
- **100%** *free of friction and wear!*

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

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HARNISCHFEGER CORPORATION

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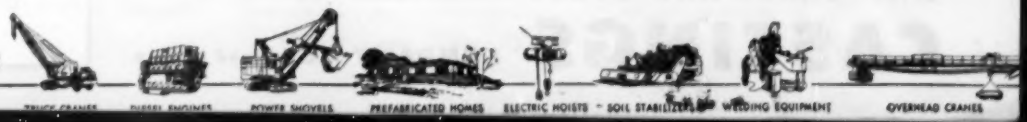
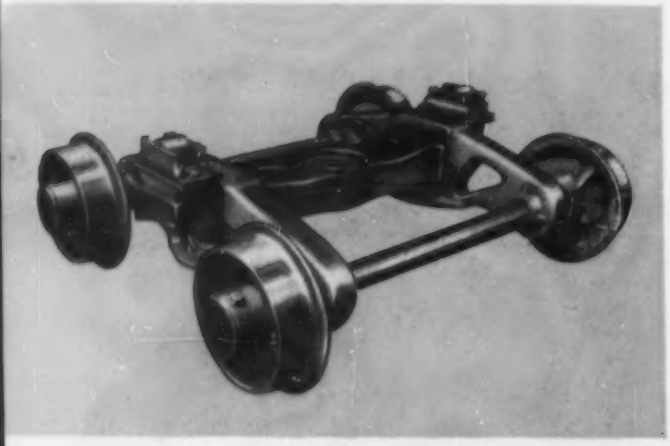
the P&H *Line*

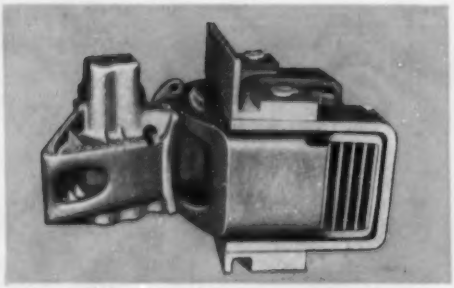




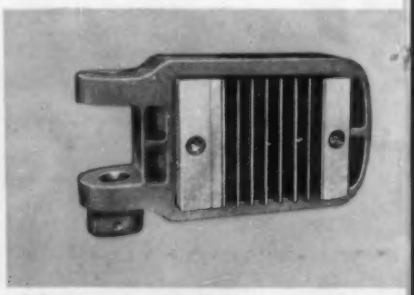
NATIONAL equipment cuts per-ton costs

NC-1 MINE CAR TRUCK is the latest example of National's pioneering in better equipment. Among NC-1 truck advantages are longer and softer ride springs, friction damping mechanism that controls vertical and transverse oscillations, automatic frame alignment and cast one-piece bolster with large lubricated center bearing. A-9021

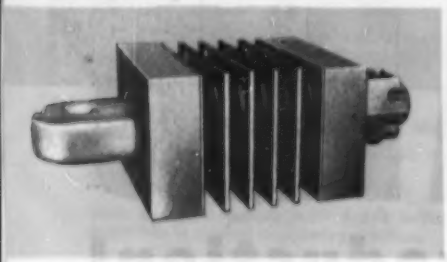
WILLISON AUTOMATIC COUPLERS save time with maximum safety, couple at either end of car or locomotive, require no manual assistance, eliminate damaging slack, permit high speeds with maximum stability.



NATIONAL MI-235 Rubber-Cushioned Draft Gear primarily used in Willison spherical-horn coupler assemblies for drop-bottom cars and locomotives; are effective with link and pin bumpers and in strap yokes.



NATIONAL MI-225 Rubber-Cushioned Draft Gear for locomotives and large capacity cars not required to operate through rotary dump. Give maximum impact protection in minimum space.

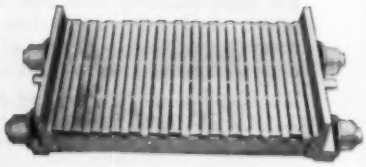


NATIONAL MI-230 Rubber-Cushioned Draft Gear for cars in rotary dump service. High-capacity rubber pads with soft initial action provide maximum impact protection, lengthen equipment life. Available in capacities and designs to fit individual requirements.

NACO STEEL WHEELS, made from quality-controlled Naco cast steel—of high yield point, great tensile strength and ductility—reduce tread spalling or flange breaking. Available in all sizes regularly used in mining or industrial operations.

NACO STEEL SWIVEL HITCHING AND LINK

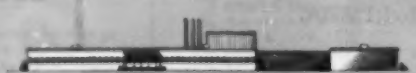
CAST ALLOY STEEL ORE-GRINDING BALLS



CAST STEEL PALLET AND MALLIX SINTERING BARS

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY • Cleveland 6, Ohio

Technical Center



"Progress through Research"

Like all PIONEER jaw crushers, the 42" x 48" has an all-welded steel base of double-wall, box-type construction. Design reduces weight, but strength is substantially greater than is possible with a cast steel base of the same dimensions.

Hydraulic process uses oil pressure to expand inner races of shaft bearings. This permits bearings to slide freely from shaft so that bearing check-up and maintenance become relatively simple. Shaft is 10' long, 14½" in diameter between bearings. Shaft stroke is 1¼".

Giant New Jaw Crusher Rated to Deliver Over 600 TPH at 13" Setting

Workmen are dwarfed by the 19,000 lb. pitman and 5200 lb. shaft assembly being lowered into place as PIONEER assembles the world's largest overhead eccentric jaw crusher. This 42" x 48" crusher reduces rocks in a 4 cu. yd. crushing chamber at a calculated capacity of over 600 tph with maximum jaw setting of 13". Minimum setting is 4". Length of moving jaw is 104"; stationary jaw, 90". Crusher was designed to reduce drilling and blasting costs.

Welded steel construction of the base allows crusher to be built with a total weight of less than 95,000 lbs. These features are important in preventing excessive maintenance cost: A patented closure between inner and outer bearings which makes it possible to place bearings closer together than on any other anti-friction bearing jaw crusher . . . thus greatly reducing shaft strain. Outer bearings saddle-mounted in the frame on precision-machined parts. Split-reversible jaw plates, cast from tough, alloyed manganese steel, designed to prevent cold flow and peening. Toggle plate safety device protects crusher when non-crushable material enters chamber.

Want the production reports on how this giant crusher can cut operating costs in mines and quarries?

Write now to

Pioneer ENGINEERING WORKS, INC.

Minneapolis 13, Minnesota

(SUBSIDIARY OF POOR & COMPANY, CHICAGO)

Ready to go. Giant crusher is ready for shipment to the U. S. Lime Products Corp., Las Vegas, Nevada. Two-unit base permits easy handling by standard equipment.

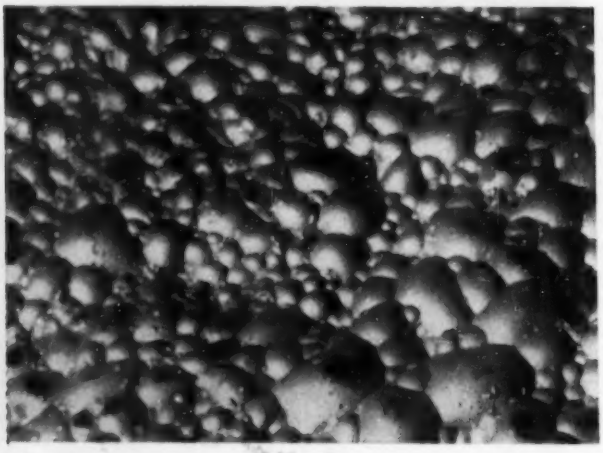
DOW

FAST, COMPLETE SEPARATION

Dow Xanthates

Assure maximum recovery, and minimum cost in the flotation of sulfide minerals.

Increased recovery and improved concentrate grade show up immediately when Dow Xanthates go to work in your mill. This has been proved in mills all over the world where these superior Dow collectors are improving metallurgy and saving dollars.

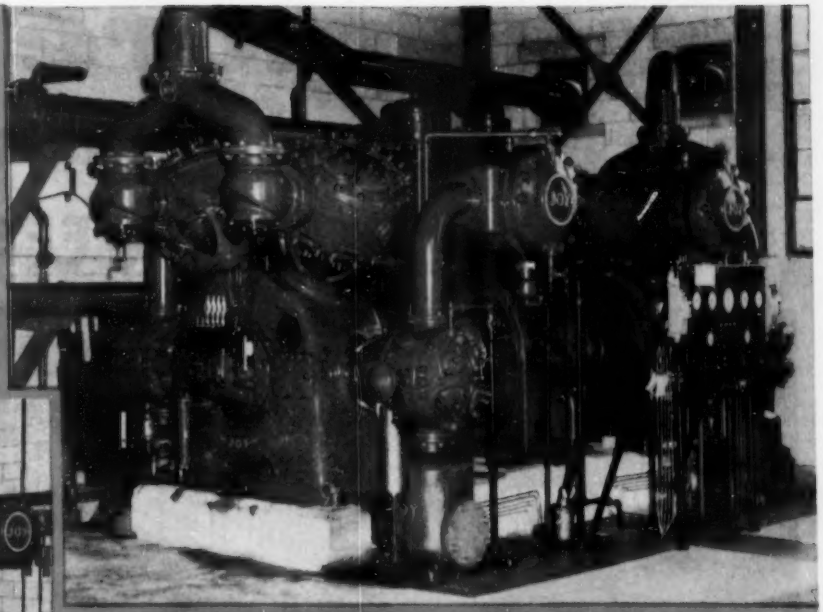


These Xanthates permit greater freedom in regulating frother and collector independently because they are reliable collectors but substantially nonfrothing.

For a quality frother, however, give Dowfroth® 250 a trial. It builds hard-working froth with reduced consumption.

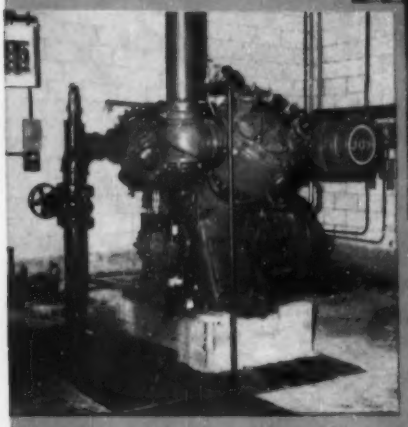
To learn more about the quality flotation agents, Dow Xanthates and Dowfroth 250, write us for information and test samples. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 835J-1.

you can depend on DOW CHEMICALS DOW



WN-114—Large metal mine installation, typical of Joy compressor installations at many modern large mines.

WN-112—Typical installation at an eastern lead-zinc mine, one of the many WN-112's in smaller mine service.



JOY LOW MAINTENANCE AIR COMPRESSORS

keep drills, slushers and mucking machines working

HERE'S WHY:

- Honed, field-replaceable crosshead and cylinder liners.
- Exclusive "Dual Cushion" Valves—large area, low lift.
- Factory assembly and testing to insure permanent alignment.
- One-piece, box-type finned crossheads.
- Full force-feed lubrication.
- Precision crankpin and crosshead pin bearings.

The Joy WN-114 and WN-112 are heavy-duty, two-stage, double-acting package-type compressors with displacement capacities from 368 to 3896 CFM. Other stationary compressors are available with capacities as low as 1.2 CFM and pressures from 30 to 600 psi. Ask Joy for an air-power survey of your mine. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

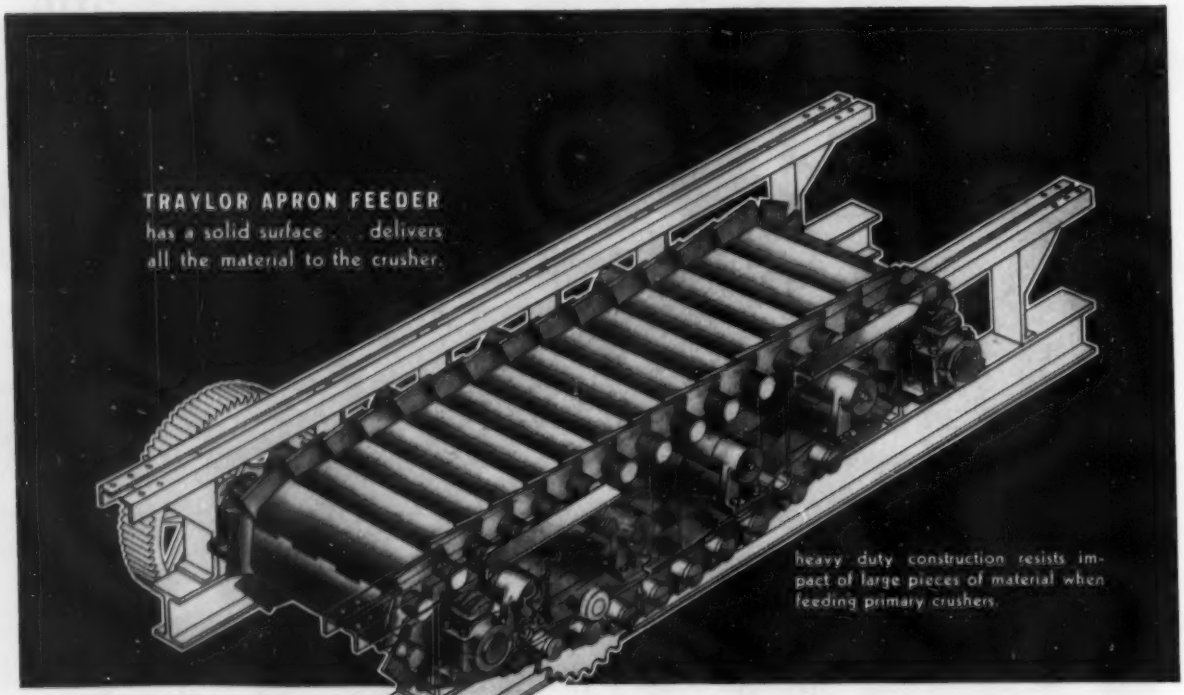
for AIR COMPRESSORS, ROCK DRILLS, HOISTS AND SLUSHERS

JOY

WAD MB408

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

get more out of your crushers WITH TRAYLOR FEEDERS


TRAYLOR APRON FEEDER
has a solid surface . . . delivers all the material to the crusher.
heavy duty construction resists impact of large pieces of material when feeding primary crushers.

A **Traylor** LEADS TO GREATER PROFITS

TRAYLOR ENGINEERING & MANUFACTURING CO.
1613 MILL ST., ALLENTOWN, PA.

New Eng. Repr.
W. H. MILROY & CO.
29 Washington Ave., Hamden 14, Conn.

INCREASED PRODUCTION is one way I can reduce my costs per ton. Send me the facts on Traylor Feeders.

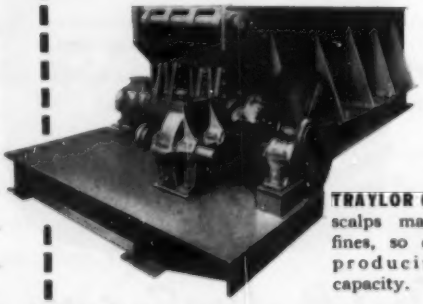
*Name*_____

*Company*_____

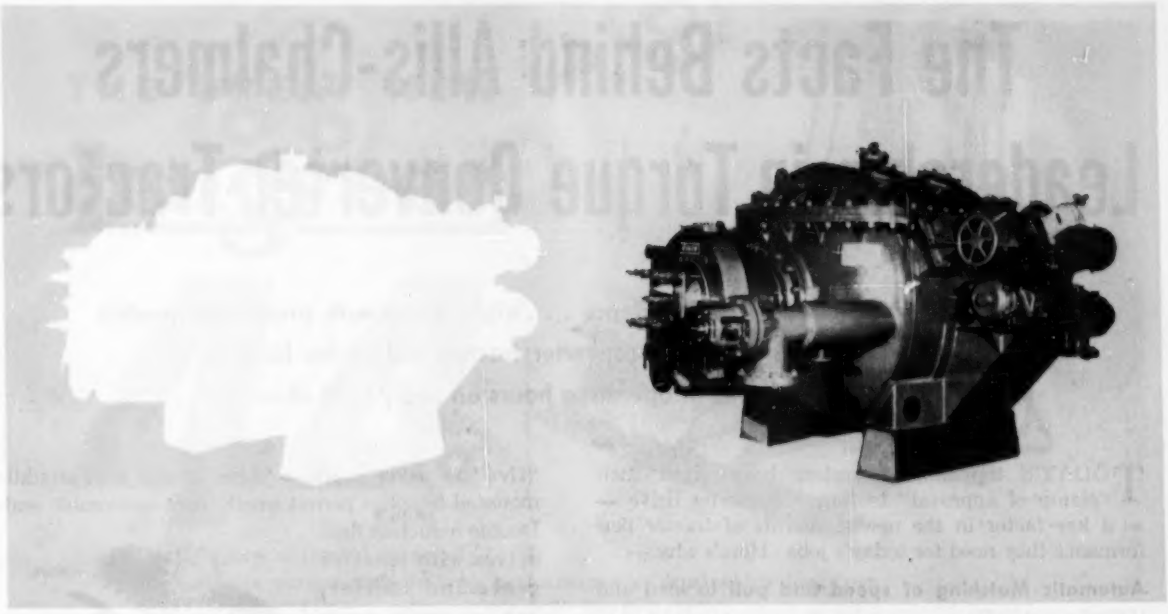
*Address*_____

*I am operating a*_____*crusher.*

No crusher can do its best with intermittent loading. A regulated feed will enable your crusher to operate at peak efficiency continuously . . . even double its present output. If you want to get more out of your crushers . . . look into a Traylor Feeder today.



TRAYLOR GRIZZLEY FEEDER scalps material, by-passing fines, so crusher is always producing at greatest capacity.



Price or Performance?

When you have a place for a filter in your flow sheet and the function of this particular step is important, your purchasing should be done on the basis of performance and not price.

If you buy on the basis of performance, with specifications and design guaranteed to meet the performance, your first choice will be an Eimco.

If your work, however, can be satisfied with so many square feet of filter area and your first consideration is price, there are many able to supply your needs.

Eimcos are not cheap because they have built into them the heavy construction, the precision design and the unique know-how that comes with more than half a century of successful experience.

Eimco will devote to your filtration problem, be it vacuum or pressure, the skill of its trained engineers in research, testing, design and construction. It will then guarantee successful results duplicating the test work necessary to prove your flow sheet.

Does your process need the best? If it does and you are willing to look beyond first cost, it will pay you to have Eimcos at the start.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Texas Birmingham, Ala. Duluth, Minn. Kellogg, Ida. London, Eng. Paris, France Milan, Italy

B-71

You Can't Beat An Eimco!

The Facts Behind Allis-Chalmers Leadership in Torque Converter Tractors

***Fourteen* years of experience . . . *eight* years with production models . . . *thousands* of torque converter tractors out in the field . . . *millions* of operating hours on every kind of work.**

TODAY'S top mine operators have given their "stamp of approval" to torque converter drive — as a key factor in the new standards of tractor performance they need for today's jobs. Here's why —

Automatic Matching of speed and pull to load and terrain conditions . . . more dirt moved every hour, day in and day out.

Hydraulically cushioned protection for engine, clutch, transmission, rear end. The entire tractor lasts longer! That means less downtime, lower maintenance costs, more profit.

Operators love it! Allis-Chalmers torque converter tractors are so easy to handle (most shifting is eliminated) that operators do a top-notch job all day long.

Yes, the industry's most experienced men are demanding and buying torque converter tractors . . . *and in this, Allis-Chalmers leads the way.*

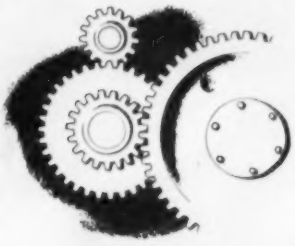
But, remember, you don't buy just one feature . . . you buy a *tractor*, with torque converter drive designed as a matched part of the entire machine. This advanced drive is only *one* of the many outstanding features that have switched so many leading users to Allis-Chalmers tractors. So . . .

Check all these features before you buy!

All-Steel Box-A Main Frame with one-piece, rear-end housing gives improved weight distribution, soaks up shocks, provides better equipment mounting, greater servicing ease . . . longer equipment life.

Service Simplicity of Unit Construction — Power drive components can be easily removed, repaired or replaced without disturbing adjacent parts . . . saving time and money.

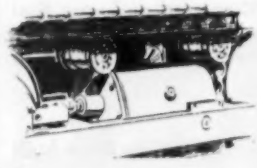
"Live" Sprocket Shafts — "Live" shafts with straddle-mounted bearings permit small, more serviceable seals. Double reduction final drives with smaller gears and shorter, heavier shafts mean extra ground clearance, better alignment, longer life.



1,000-Hour Lubrication — Tapered roller bearings and positive seals on truck wheels, idlers, support rollers and final drives extend lubrication intervals, cut downtime.

Hydraulic Booster Steering — Gives operator small tractor maneuverability with new ease. In addition, self-energizing brakes which take hold with a firm, uniform grip, provide exact control and sure safety with less pedal pressure.

True-Dimension Track provides maximum ground contact . . . plus the right design, the best steels for every job condition . . . heat-treated for long life with the industry's newest, most complete facilities.



Oil-Enclosed Track Release Mechanism — Operates in oil, seals out dirt and moisture, always in working condition to provide positive protection.

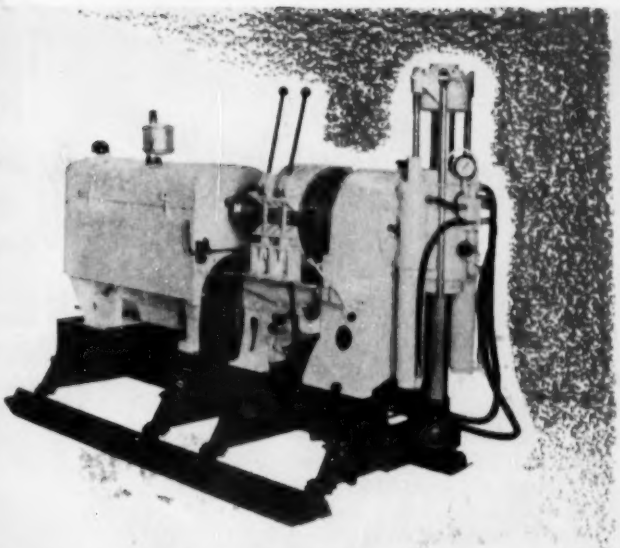
See your nearby Allis-Chalmers dealer now for the full story. Whether you're interested in a big tractor like the HD-20 or HD-15 . . . or the smaller HD-9 and HD-5, you can be sure of getting the most advanced tractor in the business, because Allis-Chalmers is the leadership line.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

THE GREAT NEW

Longyear 44



Here's a new diamond core drill,
built to give outstanding drilling performance at remarkably low cost.
The Longyear "44" is a *drill-runner's drill!* Its design is a result of recommendations from diamond drilling men all over the world.

CHECK THESE FEATURES FOR SIMPLE OPERATION AND HIGH EFFICIENCY:

- **Capacity** — 3000-4000 feet of "A" rods.
- **Heavy Duty Hoist** — a 13" drum provides extra capacity, uses planetary gears, will spool rope properly.
- **Oversize Brake Bands** — metallic linings assure safe and rapid handling of drill rods at depth.
- **Choice of Motive Power** — wide selection of gasoline, Diesel, electric or air.
- **Low Center of Gravity** — no danger of tipping over when moving from hole to hole.
- **New Swivel Head** — handles all sizes of rods, including 2-⅞" flush-coupled; Longyear Wire Line; and the newly adopted world standards.
- **Three-Jaw Safety Chuck** — permits use of 3-fluted Kelly for deeper holes.
- **Mounting** — available on a skid frame, or on a truck or trailer mounting.

Controls are centrally located for instant command of operation. Lubrication fittings are easily accessible for servicing. Gears are of finer pitch, to reduce drilling noise. Rugged construction assures long life and excellent service. In short, nothing has been overlooked to provide simple and efficient operation at the lowest possible cost to you.

The Longyear "44" is ready for your job. Send for Bulletin 90 to get full details and specifications.

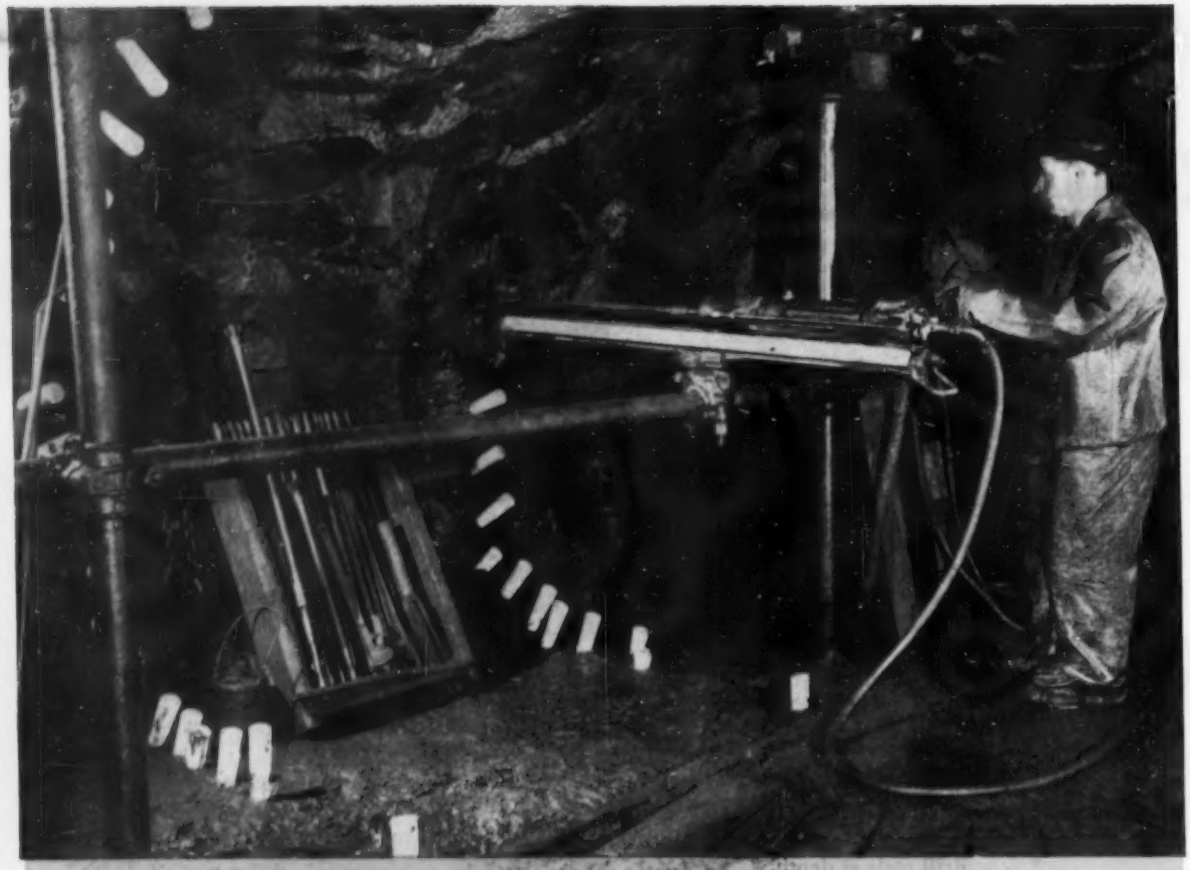
An efficient contract drilling service is available to you at low cost.

In U. S. A.
E. J. LONGYEAR COMPANY
Minneapolis 2, Minn.

Longyear

In Canada
CANADIAN LONGYEAR LTD.
North Bay, Ontario

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
GEOLOGICAL AND MINING ENGINEERS AND CONSULTANTS
REPRESENTATIVES IN PRINCIPAL MINING CENTERS OF THE WORLD



What You Need in Drifters
...GARDNER-DENVER HAS!

When you choose Gardner-Denver Drifters, you pick the right combination for tackling any hard rock drilling problem.
The right cylinder bore—2¾", 3", 3½", 4" or 4½".
The right steel change from 2 to 20 ft.
The right feed and mounting—
Model CF or SF Screw Feeds
Model CM or RM Chain Feeds
Remote feed and drill controls if required.
Send for complete drifter specifications now.

SINCE 1859

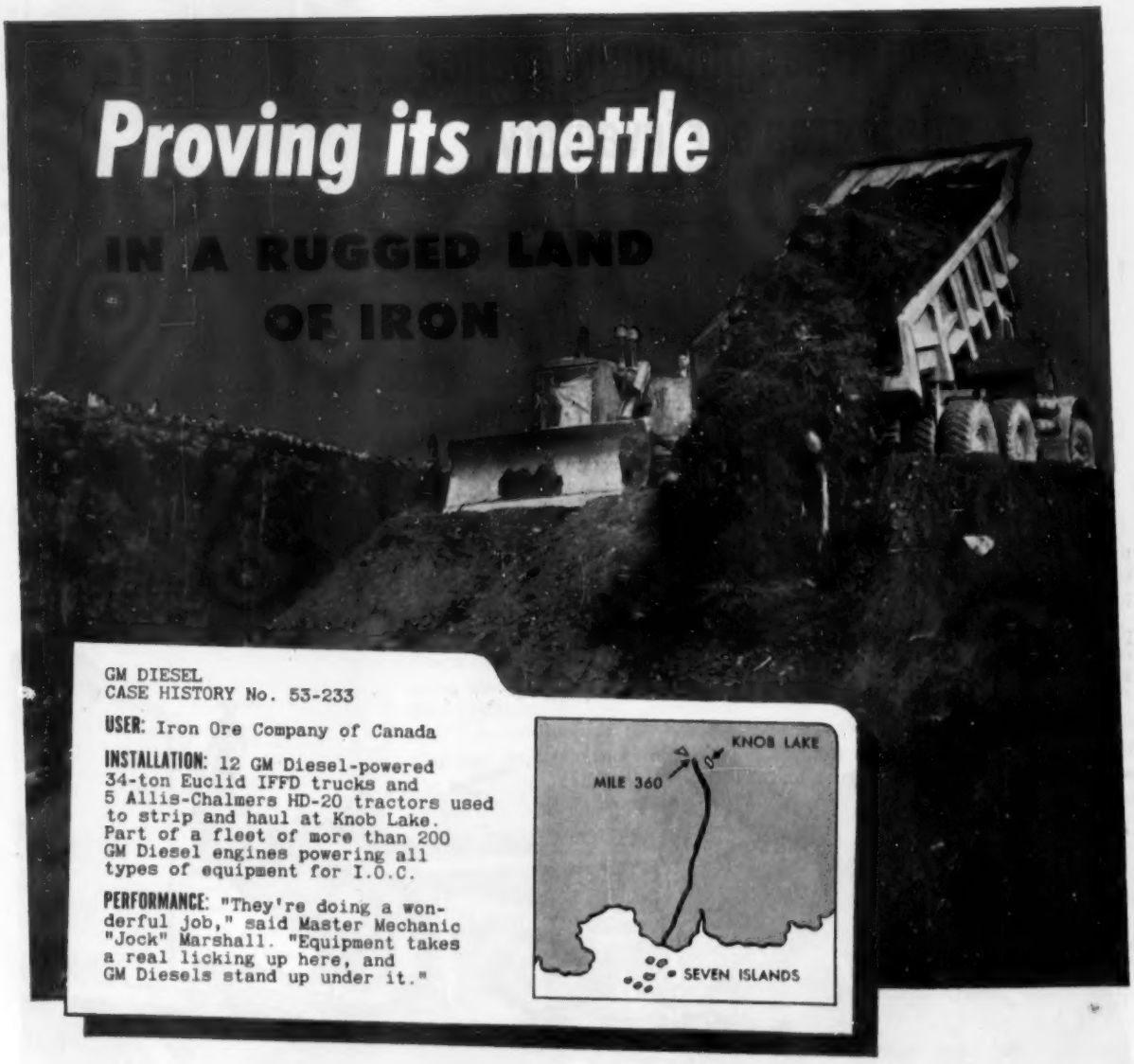
GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS
FOR CONSTRUCTION MINING, PETROLEUM AND GENERAL INDUSTRY

Export Division: 233 Broadway, New York 7, N.Y., U.S.A. • Gardner-Denver Company, Quincy, Illinois, U.S.A.

Proving its mettle

IN A RUGGED LAND OF IRON



GM DIESEL
CASE HISTORY No. 53-233

USER: Iron Ore Company of Canada

INSTALLATION: 12 GM Diesel-powered 34-ton Euclid IFFD trucks and 5 Allis-Chalmers HD-20 tractors used to strip and haul at Knob Lake. Part of a fleet of more than 200 GM Diesel engines powering all types of equipment for I.O.C.

PERFORMANCE: "They're doing a wonderful job," said Master Mechanic "Jock" Marshall. "Equipment takes a real licking up here, and GM Diesels stand up under it."

More than 200 GM Diesel Engines on vast Ungava Project

Up at "the Knob," 360 miles above Seven Islands terminal, the Iron Ore Company of Canada relies on General Motors Diesel-powered equipment—just as it has in construction of railroad, dams and facilities all along the line.

The big double-engine "Euc" and HD-20 shown above are benching access road to the rich Ruth Lake #3 deposit, first in the area to be opened for mining. They are part of a GM Diesel-powered fleet that proved its mettle by "walking" to the end of the line under its own power—a 250-mile trek over frozen tundra in blizzards and temperatures that reached 40° below zero.

These quicker-starting, faster-accelerating 2-cycle Diesels have been delivering trouble-free performance on double-shift, 20-hour-a-day schedules ever since they arrived—a tribute to both their rugged stamina and I.O.C.'s excellent preventative maintenance program.

Whatever your need for power—in trucks, tractors, air compressors, cranes, shovels—why not learn firsthand how much more profitably and dependably this versatile GM 2-cycle Diesel can deliver it? There is a GM Diesel distributor near you who will gladly give you all the facts—and you can count on him for prompt, efficient parts supply and service wherever you are.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 895 H.P.

It pays to STANDARDIZE on

. . . available in more than 750 models of equipment built by over 150 manufacturers.

GM
GENERAL MOTORS
DIESEL POWER

"T5X simplifies our maintenance... minimizes our inventory."

Roy Hill, General Field Superintendent, Mining Materials Co., Alhambra, California

"I guess the first reason we had for trying T5X was that it seemed to meet specifications for use in so many different pieces of our mining equipment.

"After testing this fine oil on several jobs over many months, we found T5X consistently superior to a variety of lubricants we previously considered indispensible.

"Of course, using T5X exclusively has simplified our maintenance in the field, but more than that, it minimizes our inventory and supply problems... important considerations when everything must be hauled miles into mountainous areas.

"As in all our operations, we use nothing but Union fuels and lubricants in the crusher, stationary engines, shovels, dozers and trucks at our Cushenbury quarry."

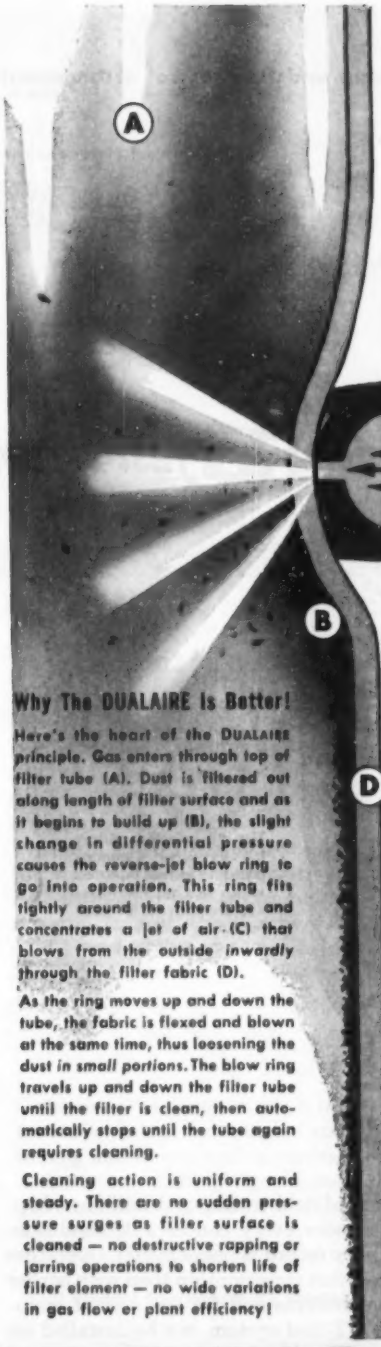
You'll find these very same reasons make T5X ideally suited for use in your mining operations, too. Why not call your nearby Union Oil Company representative and place your order today?

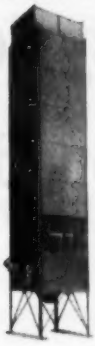
UNION OIL COMPANY 76
OF CALIFORNIA

Los Angeles: *Union Oil Bldg.* • **New York:** *45 Rockefeller Plaza* • **Chicago:** *1612 Bankers Bldg.* • **New Orleans:** *644 National Bank of Commerce Bldg.* • **Atlanta:** *401 Atlanta National Bldg.* • **Kansas City, Mo.:** *921 Rialto Bldg.*

If you use filter systems...

CHECK THESE MULTIPLE ADVANTAGES OF THE REVOLUTIONARY Dualaire* New DUST COLLECTOR!





No pressure surges!
No filter choking!
Efficiencies up to 99.99%!

Why The DUALAIRE Is Better!

Here's the heart of the DUALAIRE principle. Gas enters through top of filter tube (A). Dust is filtered out along length of filter surface and as it begins to build up (B), the slight change in differential pressure causes the reverse-jet blow ring to go into operation. This ring fits tightly around the filter tube and concentrates a jet of air (C) that blows from the outside *inwardly* through the filter fabric (D).

As the ring moves up and down the tube, the fabric is flexed and blown at the same time, thus loosening the dust *in small portions*. The blow ring travels up and down the filter tube until the filter is clean, then automatically stops until the tube again requires cleaning.

Cleaning action is uniform and steady. There are no sudden pressure surges as filter surface is cleaned — no destructive rapping or jarring operations to shorten life of filter element — no wide variations in gas flow or plant efficiency!

If you use bag-houses or other similar collecting systems in your plant operations, be sure to investigate the *many* vital advantages built into Western Precipitation's new DUALAIRE Dust Collectors. Backed by the same well-known organization that pioneered commercial application of COTTRELL Electrical Precipitators and MULTICLONE Mechanical Collectors, DUALAIRES bring entirely new performance and efficiency standards to filter-type collection systems.

As outlined at the left, heart of the DUALAIRE is a reverse-jet blow ring that travels up and down the cloth filter tube, keeping it clean without the alternate choking and pressure surges characteristic of conventional rapping, vibrating, or jarring systems of cleaning off the collected dust. *Result*—

▶ **UNIFORMLY LOW PRESSURE DROP** is assured, because the collected dust is removed steadily and in small increments — not by sudden surges!

▶ **UNIFORMLY HIGH EFFICIENCIES** — as high as 99.99% under actual field conditions — are maintained by the constantly-cleaned filter surfaces. There is no "choking" action — no variation in filter efficiency as dust accumulates!

▶ **LONGER FILTER LIFE** is obtained because the filter fabric is not subjected to destructive jarring, rapping and vibration of conventional filter cleaning methods. The Dualaire cleaning action is gentle — yet far more effective!

▶ **LESS EQUIPMENT IS REQUIRED** to handle a given capacity with the Dualaire because no standby sections need be provided for gas cleaning while other sections are shut off for rapping. The Dualaire filter is kept constantly clean — automatically — while it is filtering out the suspensions. The gas is filtered and the dust removed simultaneously — without interruption. Saves space, simplifies installation!

▶ **MAXIMUM ADAPTABILITY** to varying installation requirements is assured by the "sectionalized" design of the Dualaire. Each section is available in 5 different heights — and as many sections can be bolted together as desired to meet plant requirements. As needs increase, simply add more sections!

▶ **EFFICIENT STRAIGHT-THRU DESIGN** of filter tubes assures easier dust recovery, better flow. Dirty gas enters top of tube, is filtered through the walls, and dust drops by gravity through bottom of tube into collection chamber. Separated material does not re-entrain in the gas flow

There are many other advantages built into the DUALAIRE. *For further details send for this descriptive 12 page booklet. Or contact your nearest Western Precipitation representative!*

WESTERN Precipitation CORPORATION

DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

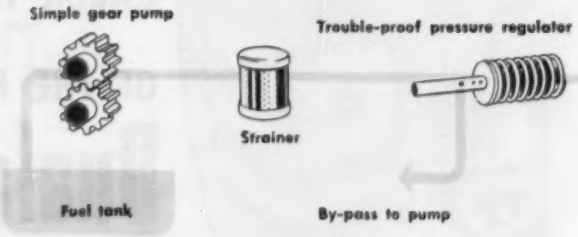
Main Offices: 1036 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2
1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

*"Dualaire" & "Multiclone" ®

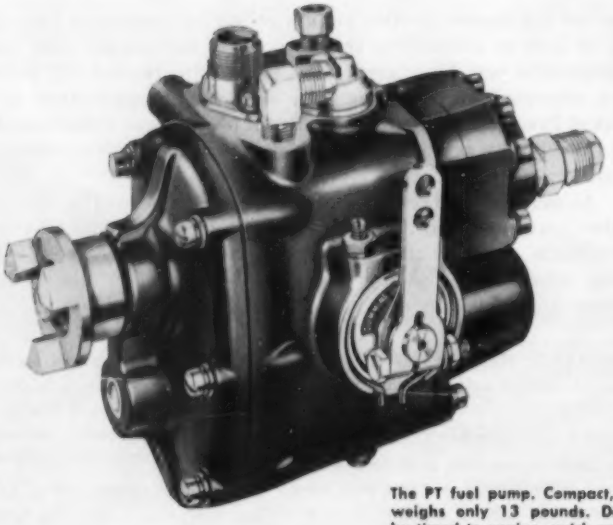
Licensed by H. J. Hersey, Jr.

Here's the simplest diesel fuel system ever developed!

Simplest pump and fuel control arrangement



Cummins new PT *fuel system...*



The PT injector utilizes the exclusive Cummins principle of fuel injection which has set the highest standards of performance and economy for more than 20 years.

The PT fuel pump. Compact, easy to handle, weighs only 13 pounds. Does not have to be timed to engine, quick and easy to install.

THE revolutionary new PT fuel system, now standard on all Cummins Diesels, has fewer and far simpler parts than carburetor and ignition systems or ordinary diesel fuel systems. It is easy to understand, simple to work with, can be serviced by any mechanic. No longer any need for fuel system specialists! The PT fuel system has undergone two years of field testing and millions of operating miles under every conceivable condition. Its dependability record is phenomenal. Operators report even less fuel consumption than with earlier Cummins fuel systems and far less cost of maintenance. The PT fuel system can be installed on any Cummins Diesel built since 1932.

SAN FRANCISCO
Watson & Meehan
Branches: FRESNO; REDDING. *Authorized Sales & Service:* STOCKTON—Stockton Fuel Pump & Injector Service; SACRAMENTO—Frank J. Coyle; EUREKA—Fred E. Barnett; RENO—Nevada Transit Company.

LOS ANGELES
Cummins Service & Sales
Branch: BAKERSFIELD. *Authorized Sales & Service:* BISHOP—Inyo Diesel Service; BLYTHE—Lee's Diesel Service; COLTON—Smith's Diesel Sales; EL CENTRO—Rhyne's Automotive Service; SAN LUIS OBISPO—San Luis Truck Service; SAN DIEGO—E. W. Equipment Company; SANTA MARIA—Hanson Equipment Co.; BAKER—Newton Automotive Service; LAS VEGAS—Stirling Diesel Service.

PHOENIX
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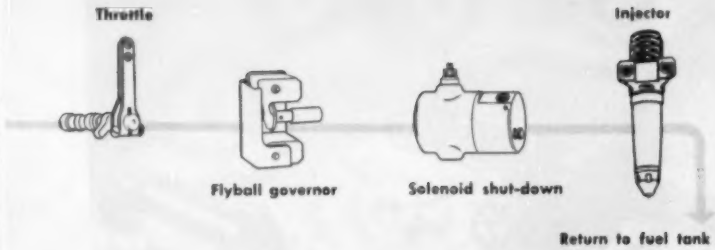
SALT LAKE CITY
Cummins Intermountain Diesel Sales Co.
Authorized Sales & Service: CEDAR CITY—Wally's Chevron Truck Service; IDAHO FALLS—Automotive Body and Machine, Inc.

(5-18-54)



PT advantages over gasoline systems:

No contact points to adjust
No condenser to replace
No spark coil to short
No wiring harness to short
No spark plugs
No vapor-lock problems
No flooding
No choking or priming
No needle valves to clog
No butterfly valve
No float level to maintain
No float valve to stick

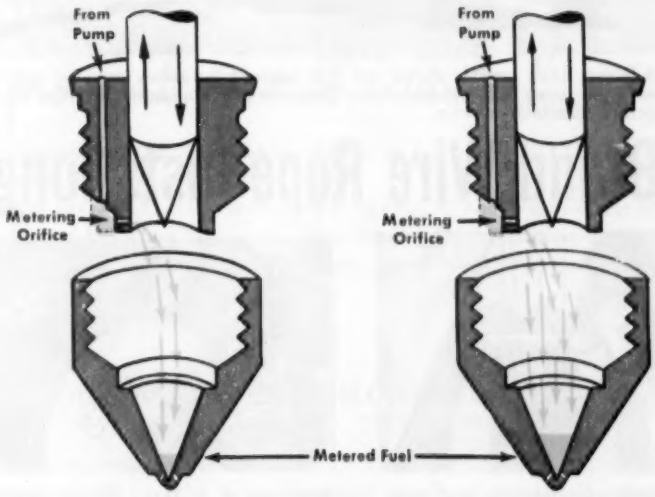
PT advantages over ordinary diesel systems:

No fuel rack adjustments
No check valves
No needle valves
No helixes
No distributor discs
No metering pumps
No high-pressure fuel lines
No fuel pump timing

. . . simpler to work with than gasoline carburetion and ignition

Simplest Fuel Metering Device

The principle is simply that the amount of fuel flowing through a fixed orifice varies according to the amount of pressure on the fuel. Pressure is controlled by the throttle on the PT pump. Fuel flow through orifice is cut off as injector plunger, actuated by engine camshaft, moves down to inject fuel.



When engine is under partial load, fuel pressure is low, and only a small amount of fuel passes through orifice into injector cup.

When engine is under full load, fuel pressure is increased, and greater amount of fuel passes through orifice into injector cup.

Cummins Diesels (60 to 600 h.p.) for trucks, buses, construction and mining machinery, logging yarders and loaders, drilling rigs, power generators, irrigation systems, and boats.

Mail today for more PT facts!

CUMMINS

leader in lightweight highspeed diesel power 60–600 h.p.

CUMMINS ENGINE COMPANY, INC., Dept. MW-12
Columbus, Indiana

Please send me free illustrated folder, "Cummins PT Fuel System."

Name _____

Company _____

Address _____

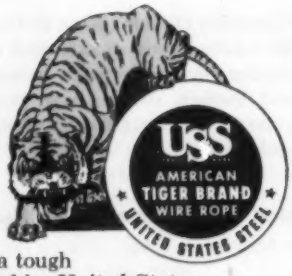
City _____ Zone _____ State _____

Load lines and boom lines on this shovel are just some of the many uses for tough, long-lasting Tiger Brand Wire Rope. Draglines, dipper hoist ropes, scraper and dump lines are also applications where Tiger Brand Wire Rope helps to keep down costs and give long, dependable service.

Tiger Brand Wire Rope lasts longer, cuts costs!

Sound basic engineering and close supervision of manufacturing practices are just two of the reasons why Tiger Brand Wire Rope wears evenly, resists abrasion. Crane and shovel operators like the ease of handling Tiger Brand. And because it gives such good service under all conditions, "down time" is reduced to a minimum.

Services of a Tiger Brand Representative and Tiger Brand Field Engineers are always available to help solve your wire rope problems. If your wire rope application is an unusual one — or its operating conditions are severe — they will make specific recommendations for your equipment and conditions of service.



To cut costs on all of your wire rope operations, rely on extra tough American Tiger Brand, the wire rope that is rigidly controlled by United States Steel from raw ore to finished product. For further information or field service, contact your local distributor, or write Columbia-Geneva Steel Division, United States Steel Corporation, 1403 Russ Building, San Francisco 6.

USS TIGER BRAND Wire Rope

United States Steel Corporation · Columbia-Geneva Steel Division
In the East: American Steel and Wire Division

UNITED STATES STEEL

This simple idea saves money in V-Belt Costs

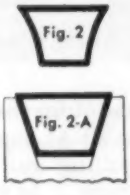
You can prove it in two minutes!

To prove how the CONCAVE SIDES of GATES VULCO ROPES *save money*, just make this simple test—

Bend *any* V-Belt that has *straight sides* (Fig. 1) and—as the belt bends—*feel* the sides *bulge out* (Fig. 1-A). This out-bulge concentrates the wear at the points shown by arrows—and this naturally shortens the life of a *straight-sided* belt!

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

(U. S. PAT. 1813699)



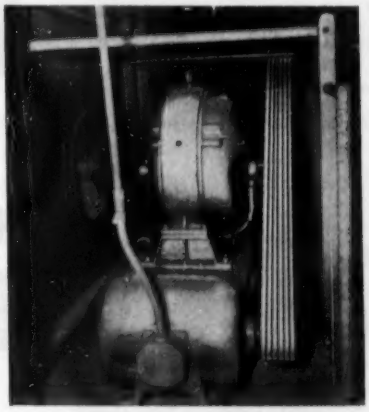
You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE—and this means *longer* belt *life* and *lower* belt *cost* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the GATES VULCO ROPE!

VULCO ROPE DRIVES

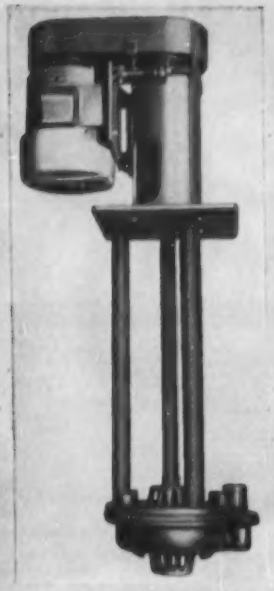
THE GATES RUBBER COMPANY
DENVER, U.S.A.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

CS-548

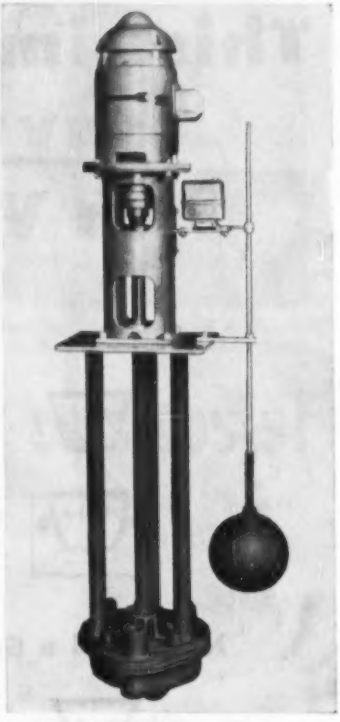


Model 300 Sump Pump

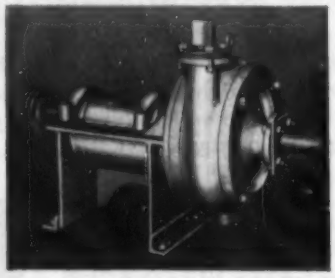
Galigher Acid-Proof SUMP PUMP

SLURRIES • CORROSIVES • FROTHS

This rugged, welded steel, rubber covered sump and froth pump is built to handle industry's toughest pumping jobs. Its application covers hundreds of materials in a score of industries including pumping acids, salts and chemicals and material containing up to 60 per cent solids—does not air lock or choke. The following are typical daily jobs in mining, metallurgical and chemical industries: floor clean-up . . . flotation tailings, concentrates and middling froth return . . . acid leakage from process tanks . . . solution transfer . . . uranium leach slurries and solutions . . . mine drainage . . . pickling solution . . . waste disposal . . . HC1, $CaC1_2$, HNO_3, H_2SO_4, H_2SO_3 . . . ceramics handling . . . saturated brines.



Model 200 Sump Pump



We also manufacture the well known VACSEAL pump for material handling and corrosive solutions. Sizes 2" to 8".

- **CAPACITY**
  Pumps illustrated (models 200 and 300) deliver up to 100 GPM, handling heads up to 50 feet.
- **VERSATILE DESIGN**
  Light, portable—Intermittent or continuous operation—Direct or V-belt drive—Constant or variable speed.
- **SIMPLE CONSTRUCTION**
  No submerged bearings—No packing gland—No mechanical seal—Rubber-covered parts—Solid rubber impeller—Double suction thrustless impeller.

MAIL COUPON
for detailed information on your pumping problem.

THE GALIGHER CO.
P. O. Box 209, Salt Lake City 10, Ut.
Gentlemen:
Please send me information on a pump that will handle the following:

1. Liquid.....
2. % solids.....
3. °F.....
4. pH.....Type of acid.....
5. GPM.....
6. Head (ft.).....

Name.....
Company.....
Address.....

Leaders in Experience and Service

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METALLURGICAL DIVISION
THE GALIGHER COMPANY
ENGINEERING SERVICE

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Agents In All Principal Foreign Mining Districts

EASTERN OFFICE
921 Bergen Avenue
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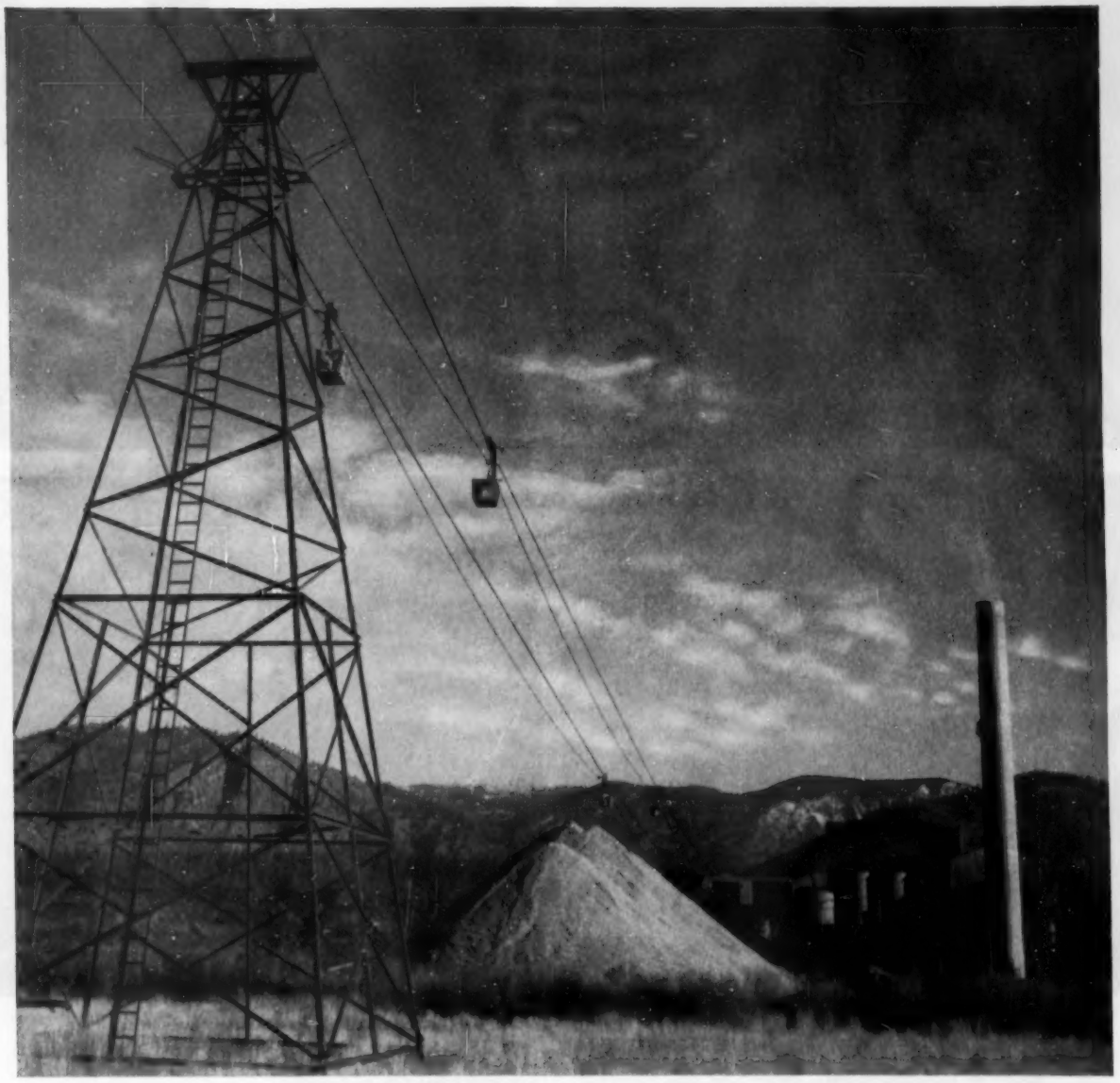
New Jersey



Wire Rope at Work — Near Chewelah, Wash., is the 13½-mile aerial tramway serving the properties of Northwest Magnesite Co. Built in two sections by Riblet Tramway Co., this aerial carrier hauls magnesite ore to the concentrating mill, thence to the big reduction plant. It is one of the finest ever built, and one of the longest.

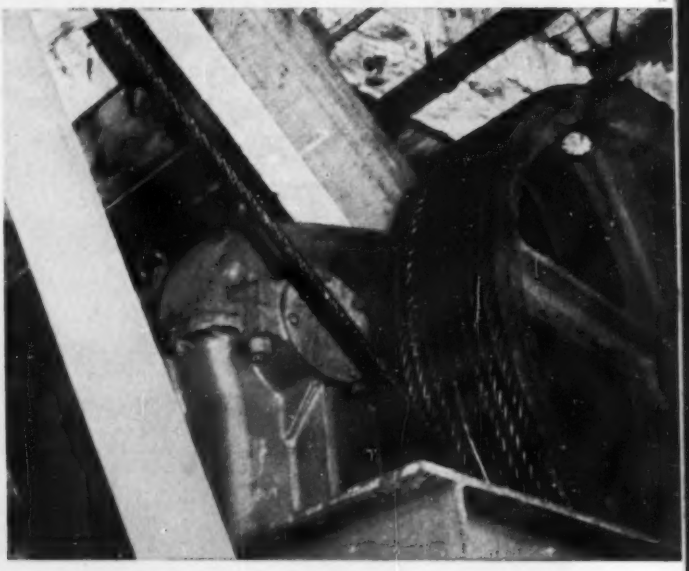
The system depends in large measure upon sturdy wire rope, and approximately 140,000 ft of Bethlehem traction ropes haul loaded and empty buckets on both legs of the tramway. These ropes consist of 1-in. 6 x 19 on one section, ¾-in. 6 x 7 on the other—Purple Strand grade, of course, to assure maximum strength, toughness, and wear-resistance.

Our engineers are experienced in the selection of mining ropes. They'll gladly recommend the grade and construction that's best for the conditions peculiar to each job. Before you buy your next rope, call the nearest Bethlehem Pacific sales office and ask to have one of our engineers study your installation.

Bethlehem Pacific Coast Steel Corporation; Sales Offices: Los Angeles, San Francisco, Portland, Seattle, Spokane. Wire Rope Depots: San Francisco, Seattle

Bethlehem Wire Rope is stocked by leading distributors throughout the West

BETHLEHEM PACIFIC



EXTRA FLEXIBILITY—Wire rope encounters fast sheave action, reverse bending, constant stop-and-start operation on many jobs. When this same rope must also lift or pull heavy loads, an unusually flexible, strong wire rope is needed.

Rope jobs like paver skip hoists, overhead cranes, large shovel and dragline hoists, and sawmill carriages demand these qualities. That's where the use of 6 x 37 Red-Strand wire rope saves time and money.

Where will 6x37 Red-Strand improve your wire rope service?

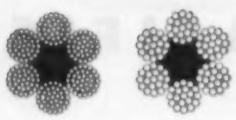
Look at a cross section of 6 x 37 wire rope. You see three rings of small, uniformly sized wires in each strand. This differs from a rope construction like 6 x 19, which contains fewer and larger wires.

The *smaller size* wires make 6 x 37 more *flexible*. The *larger number* of wires maintains rope *strength*.

Would this combination improve your wire rope service? Would it solve a problem for you? Leschen's higher-than-rated quality is also providing longer-than-expected service to heavy industry everywhere.

Check with your Leschen man. He can help you.

Leschen's 64-page Wire Rope Handbook tells you all about 6 x 37 and other Red-Strand wire rope constructions. Ask or send for your free copy.



6 x 37 6 x 19

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

Drifts and Crosscuts

1954 In Review

At this time last year the Editors, of MINING WORLD reviewed the many and varied developments in the minerals industries during 1953. Once again another year is almost history. It's time for a similar review covering 1954.

First let's see how the 1953 Review and in particular *Things To Watch in 1954* stood the test of time. Not too badly when the *Metallurgical Development* of 1953—the Burwell filter—is now being manufactured by the Eimco Corporation and has proved successful in several mills. Perhaps the most successful forecast *In Things To Watch in 1954* was for new discoveries and increasing ore reserves in the Grants-Laguna district of New Mexico. See below for more of this important district.

Now for a review of 1954!

Uranium as the *Metal of 1954* figures prominently in reader interest and world-wide importance. The mining industry might almost say "Thank God" for uranium. It has made the average man conscious of the mining industry, of the fact that an individual can strike it rich, and that a United States citizen has the opportunity and right to locate his own claim.

Trend of the Year was the growing stockpiles of uranium ore waiting to be milled, and these stockpiles are backed with ever increasing blocked out reserves ready to mine. Another trend of importance was the rush of miners of other metals to uranium. The companies of the Coeur d'Alenes figured prominently in this.

Exploration Trend has been the ever increasing use of geophysics. Notable progress and important uranium discoveries have been made by flying scintillometers. Publication of the full report of Pima copper discovery in Arizona gave an impetus to geophysical prospecting.

Canada once again was the scene of the *Foreign Discovery of 1954*. It was the Manitouwadge district in Ontario where more than 8,500 claims have been staked for copper-zinc-silver. American Metal Company's base metal discoveries at Little River, New Brunswick were a close runner-up to Manitouwadge. In the *United States the Discovery of 1954* was the extensions to Anaconda Copper Mining Company's Jackpile uranium ore body on the Laguna Indian Reservation, New Mexico.

Open Pit Mine of the Year honors go to Anaconda Copper Mining Company's Yerington mine for the well planned, carefully scheduled, and efficient operation. *Underground Mine of the Year* was in the Orange Free State of South Africa and was the Virginia Orange Free State Gold Mining Company Limited. The first gold bar from this mine in which Kennecott Copper Corporation holds an important interest was poured on September 23. Certainly the Jackpile mine of Anaconda deserves important mention in the open-pit category as does the Pima Copper Company's Pima mine in Arizona for an underground mine.

American Smelting and Refining Company's Silver Bell copper mill in Arizona takes top honors as *The Mill of the Year* for its labor and cost saving design. Sharing mill acclaim is Humboldt Mining Company for its Humboldt mill for the world's first large-scale jasper flotation.

Mining Developments of the Year featured continuing studies for the drilling of smaller blast holes underground. The use of a special rotary drill for large diameter break-to hole in burn cut rounds at White Pine Copper Company. Koepe-type hoisting is of growing importance on a world basis with the first hoist of this kind in the United States at Cleveland-Cliffs Iron Company's Cliffs shaft. In Canada Falconbridge Nickel Mines Limited will use Koepe hoists. In Africa, West Driefontein Gold Mining Company, Ltd. and Bancroft Mines Limited are both installing this type of hoist.

Classification was the *Metallurgical Development* of the year. A growing branch of classification—cyclones—were listed last year and their use has expanded markedly. It is not unusual in many recently built mills not to see a single mechanical classifier. Another type of classifier—The Finney Belt—was first announced at the Colorado Mining Association convention in February and successfully passed the pilot plant stage with commercial scale testing planned before year's end. The magnetic classifier, developed on the Mesabi Range is the third important classification development.

Exploration Drilling had a number of important developments during the year. They were: E. J. Longyear Company's wire line diamond drill core barrel. The Bore Hole Camera developed by the Corps of Engineers, Department of the Army. Improved dust sampling equipment and techniques, and the dry shot hole rotaries in the uranium districts resulted in a higher percentage of exploration footage by dry rotary drilling.

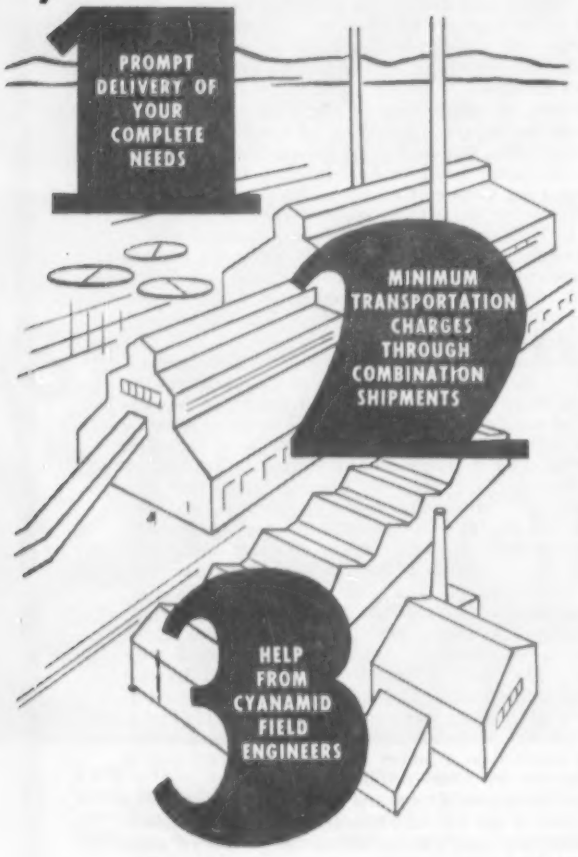
The *Geological Discovery* of the year was the recognition of the La Sal Mineral Belt as an important uranium host, particularly where this peripheral zone around the La Sal Mountains is intersected by northwestward trending faults and fissures.

The *Prospector's Discovery of 1954* was the finding of uranium at Miracle Hot Springs, California by H. B. and J. Mann, E. and D. Bartlett, C. Musick, W. Rogers, and George Kilmer. The prospectors formed the Miracle Mining Company and shipped California's first railroad car of uranium ore before selling their claims to the Wyoming Gulf Sulphur Company.

Accomplishments in Mining centered on iron, and were the first shipments of Laborador iron ore by the Iron Ore Company of Canada, and first shipment of Cerro Bolivar ore from Venezuela by the Orinoco Mining Company.

MINING WORLD was both honored and privileged to have the opportunity to once again present the *Mining Article of the Year*. For 1954 it was the full report on Anaconda Copper Mining Company's Yerington operation in the July issue.

YOU GET ALL 3 WHEN YOU ORDER *Cyanamid* REAGENTS



Cyanamid . . . and only Cyanamid . . . offers a complete line of Cyanidation and Flotation Reagents and auxiliary metallurgical chemicals. To serve you promptly as well as economically, we maintain strategically-located stocks in the West and Southwest. Orders may be placed with our New York office or with American Cyanamid Company, 1440 Broadway, Oakland 12, California; El Paso, Texas; c/o Weicker Transfer & Storage Co., Denver, Colorado; or c/o Goodwin & Mayflower Moving & Storage Co., Spokane, Washington.

AMERICAN *Cyanamid* COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK

OAKLAND, CALIFORNIA • EL PASO, TEXAS

The Records of Accomplishment in Mining were both set in the Union of South Africa in 1954. They were the sinking of the No. 2 shaft of the Merriespruitt Orange Free State Gold Mining Company Ltd., 597 feet in June to set a new world record for monthly footage, and the record for deep drifting—below 8,000 feet depth—of 1,230 feet in 26 days at the Durban Roodepoort Deep Ltd's. mine in May.

Surprise of 1954 was the mercury market. With available supplies almost nonexistent, the price for mercury, when obtainable, reached $330.00 a flask for an all-time high.

The Exploration Tool of 1954 was the Varian Associates' nuclear precession magnetometer. Two experimental units had been finished by year's end. The instrument is portable, does not require precise orientation, does not need calibration, can be read instantly, and accuracy is determined by measurement of a frequency.

Dow Chemical Company's Separan 2610 can be termed the *Reagent of the Year* because its use speeded a difficult uranium filtering problem. Other applications are constantly being found.

The Mining Company of 1954 is the Anaconda Copper Mining Company for its record of accomplishment in copper at Yerington and the Kelley block caving project at Butte. Also, and perhaps most importantly, for its uranium successes in the Grants-Laguna area of New Mexico.

Man of the Year in Mining was Vernon Pick. Any prospector who unassisted can find, develop, bring into production, and sell his uranium discovery for $9,000,000 has set a modern day mining miracle. Base metals, less glamorous but just as necessary, had their champion in Otto Herres, chairman of the National Lead and Zinc Committee, whose untiring work was instrumental in bringing to the attention of the executive branch of the Federal government the importance of a healthy domestic mining industry.

Things To Watch in 1955 will be two new deep vertical shafts in Utah's Big Indian uranium district. Simultaneous furnacing of lead-zinc ores with recovery of both metals. Large-scale operation at the Pima copper mine. Open pit copper mining in Montana. Hanna Nickel Smelting Company's operation in Oregon. Expanding use of the Gismo in flat dipping deposits. While not in 1955 but sooner than you think, a broad gauge railroad locomotive fueled with uranium and hauling uranium to market over the same rails that the very same uranium locomotive fuel was hauled in 1954 and in 1955, too.

Once again but apparently further away than last year is *The Miner's Hope* for a free market for his domestically mined gold.

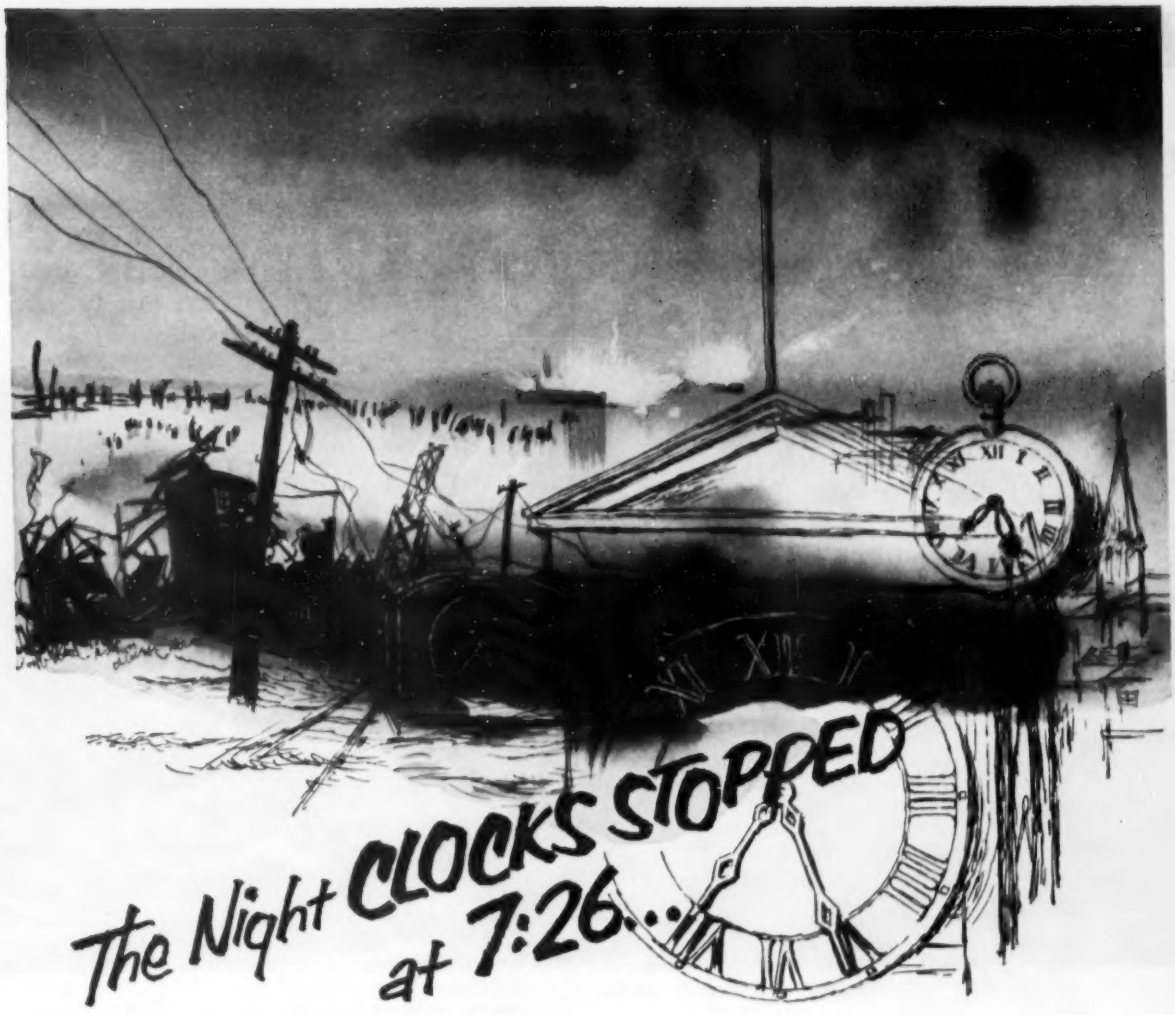
COMING CONVENTIONS

February 3 through 5, 1955. The 55th Annual Convention COLORADO MINING ASSOCIATION and affiliated groups. Shirley Savoy Hotel, Denver, Colorado.

February 7, 8, and 9, 1955 McINTYRE-SARANAC CONFERENCE, Saranac Lake, New York.

February 14 through 17, 1955 Annual meeting AMERICAN INSTITUTE OF MINING ENGINEERS, Conrad Hilton Hotel, Chicago, Illinois.

March 7 through 11, 1955, Joint meeting AMERICAN SOCIETY OF PHOTOGRAMMETRY and AMERICAN CONGRESS ON SURVEYING AND MAPPING, Washington, D. C.



Some 9,500 people were in South Amboy, N. J., that drizzly evening in 1950. At the waterfront, longshoremen were transferring the last of 12 freight cars of ammunition to lighters that would carry it to a waiting vessel in Raritan Bay.

But the City Hall clock never got to 7:27—and the freighter's deadly cargo never got loaded. Explosions shattered windows over a radius of 12 miles; and hundreds of people looked at their arms and legs and saw that flying daggers of glass had stabbed them.

At dawn, 312 of the injured had been counted.

★ ★ ★

Such disasters have happened many times before in America. They could happen again. And *if* they do—and *when* they do—there must be blood plasma on hand to take care of the injured. For blood saves lives!

But blood cannot be mined or manufactured. It must come from the veins of healthy men and women. Men and women who feel concern for a suffering neighbor. So give blood—now!

Whether your blood goes for Civil Defense needs, to a combat area, or to a local hospital—this priceless, painless gift will some day save an American life!

Give Blood Now

CALL YOUR RED CROSS TODAY!

National Blood Program

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

How to handle more material per dollar—YEAR AROUND

THIS Caterpillar No. 6 Shovel has no chance to loaf. It's shown here cutting down a bank of dirt and loading it for road-building fill at Scott County Stone Co., Inc., Scottsburg, Indiana. In addition, it stockpiles and loads crushed rock—keeping busy the year around, no matter what the weather or the ground conditions.

Many owners of No. 6 Shovels also use them for stripping and loading overburden, grading, excavating and cleaning up. Underground, its low over-all height, freedom from overhead clutter, and turning ability enable the No. 6 to put out plenty of work in tight places. With its long bucket reach, the No. 6 Shovel easily loads high-sided hauling units.

One reason for the high work capacity of the CAT* No. 6 Shovel is its carefully engineered balance. Weight distribution, horsepower and bucket capacity are matched so that with capacity loads the tracks are on the ground providing traction from sprockets to front idlers. Another reason: the two-yard bucket tips back 35 degrees in the first few feet of upward travel after loading, so it retains a heaping load of even loose materials, and dumps *clean*.

Bucket controls are well-placed and designed for easy, accurate operation. Ralph B. McNeely, operator of the shovel in the picture, says, "I can do a big day's work with little effort. This machine is powerful, easy to handle, and has good visibility at all times." This fast and easy operation cuts costs. Further savings result from the ability of the rugged Cat Diesel Engine to deliver full and *foul-free* power for only pennies per hour on inexpensive No. 2 furnace oil, thanks to its exclusive, Caterpillar-built fuel injection system.

Your Caterpillar Dealer will demonstrate *on the job* the shovel that will do the most work for *you* at lowest cost. See him today. And count on him whenever you need skilled service and genuine Caterpillar parts.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill., U. S. A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Capitol Concentrates

Many Problems In Bartering Surplus Agricultural Products For Minerals

The Commodity Credit Corporation is busily searching for barter deals authorized under the Agricultural Trade Development and Assistance Act of 1954. The laudable intent of the act is to unload upon friendly nations the agricultural surpluses now plaguing us in return for strategic and critical materials, mostly for the long-term stockpile. One of the barter deals in the past was for mercury which, it is claimed, was obtained at a great bargain. It must be quite a trick to figure equivalent values based on domestic prices, world prices and rates of exchange. Another interesting development in the foreign field is the issuance of export licenses for hides and leather to Iron Curtain countries, which could indicate that the ice is breaking in that direction.

• ODM's Action Is A Bit Curious

The Office of Defense Mobilization withheld its release of government copper to industry until the mine strikes had been settled—thus it could not be accused of strike breaking. On the other hand, the shortage of copper caused partly by those strikes was promptly alleviated by diverting copper to industry when it appeared that unemployment might be aggravated in the copper fabricating areas. At a time when copper appeared to be a drug on the market and domestic mines curtailed sharply, ODM made no gesture to relieve unemployment in the copper mining areas. Are eastern pressures more potent than western pressures? Or did the month and year have something to do with it?

• Career Employes Are Appointed

It is both interesting and gratifying to note that the new positions created by the adoption of the U. S. Bureau of Mines' reorganization plan have been filled by appointing career employes from within the Bureau. The technique of bringing in outside talent has been much too frequent in the government.

• SEC Revises Rules

Those planning to finance new mining ventures will be greatly interested in the rules adopted recently by the Securities and Exchange Commission to conform to a new law passed by the last Congress. The changes became effective October 10.

Last August, the President signed into law the Administration's bill to overhaul the acts administered by the SEC. The most important amendment permits the use of written offers to sell and buy securities during the "waiting period" through preliminary prospectuses filed with the commission. The "waiting period" normally is 20 days between the time a registration statement is filed with the SEC and its effective date.

The problem still remains, however, to find "venture" capital in these high income and capital gains tax days where, if you "venture" and win, the government takes most of the winnings, but if you lose you charge it all off to personal experience.

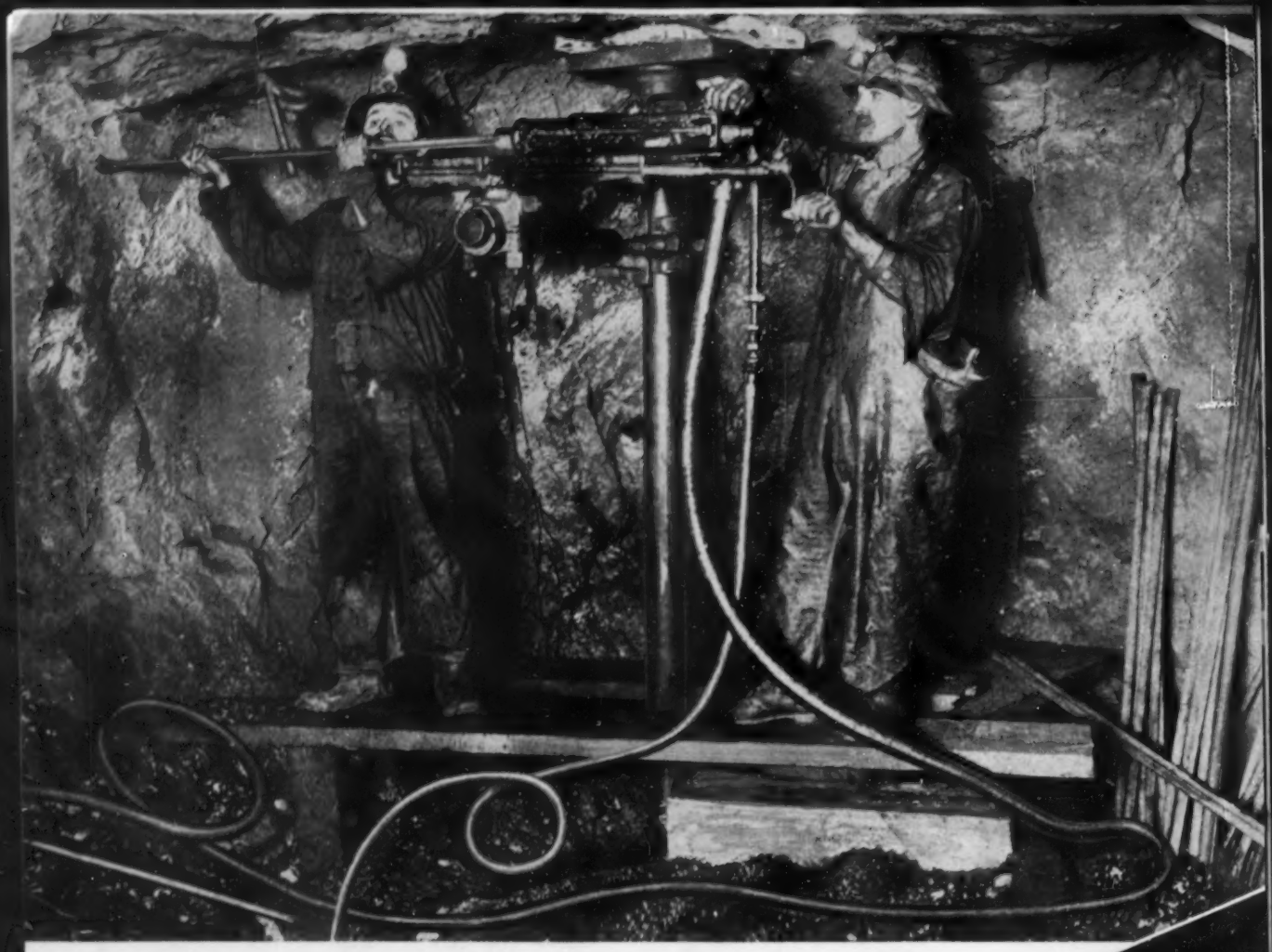
• Slight Encouragement for Manganese Miners

There seems to be very little hope that the long-term stockpiling program for domestic manganese will do any good since the Office of Defense Mobilization has directed that purchases be made at the market or below the market. How many domestic producers can sell 46 percent manganese at 75 cents per long ton unit and make money? And just how much manganese does ODM expect to be able to purchase at or below that figure? The answer to both questions, in all probability, is "none!"

Domestic producers of manganese may as well face the fact that their product has a very low priority on the procurement list, and that every purchase made at $2.30 per unit gives the Bureau of the Budget severe pains.

• Supply And Demand Law Threatened

The stockpile mechanism is being utilized more and more to loosen up or tighten metal supplies on the domestic market. Although the actual stockpile is locked up by law so that the President can authorize the release of materials only "in time of war or during an emergency with respect to common defense," stockpile purchases and prices are only limited by appropriations. Thus releases can be made by the Office of Defense Mobilization by diverting to industry material on order before it technically is locked up. The recent authorization by ODM to divert 17,500 tons of copper to industry is a case in point. This may have been a necessary and desirable order, but it points to the possibility of GSA's accumulating a stockpile of materials ordered for the national stockpile but not placed in it, said supplementary stockpile being held for ODM to use in controlling prices. Perhaps such price and supply control is not widely intended, but already ODM is playing hob with the cherished law of supply and demand.



Thermoid Hose designed specifically for use in mines

Thermoid designs and manufactures many types of hose built to give longer service and lower operating costs in a wide variety of specific applications. These 3 are ideal for rugged mining work:

THERMINE Heavy duty air hose, mandrel-built with oil resistant tube reinforced by high tensile yarn. Smooth, abrasion-resistant cover.

THERMOFLEX Mandrel-built air hose for extreme service and direct connection to compressors. Smooth, black, abrasion-resistant cover.

#325 SUCTION HOSE For heavy duty water suction service. Smooth bore, wrapped hose with heavy wire reinforcement, durable cotton duck plies.

Thermoid research is responsible for new, better construction that makes Thermoid hose more durable . . . easier to handle. In addition to hose, your Thermoid Distributor also carries a complete line of Thermoid Conveyor Belting and Multi-V Belts. Call him for complete information. Or if you prefer write direct.

Thermoid Western Co.

Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Nephi, Utah Trenton, N.J.

Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

December, 1954

INTERNATIONAL PANORAMA

KUALA LUMPUR, MALAYA—The entire output of the Sri Medan iron mine of the Malaya Miners Co., Ltd. has been contracted for delivery to the Japanese firm, Yawata Iron and Steel Company.

MONTICELLO, UTAH—Uranium ore production is to be doubled to 60 tons daily by Fletcher-Bronson at their underground Happy Jack mine. More than 350,000 tons of high grade ore has been blocked out in the last several years by four men.

MANILA, PHILIPPINE ISLANDS—The Central Bank of the Philippines has set a price between £105.40 and £111.72 ($52.70 and $55.86) per ounce of newly mined gold in the Philippines. Price is determined by mine classification as marginal or non-marginal.

ELY, NEVADA—Minerals Engineering Company, operator of tungsten mines and mills in Montana and a tungsten refinery at Salt Lake City, has leased the 150 ton per day Baltimore-Camas mill here and the Monte Cristo tungsten mine 60 miles away.

RIVERTON, WYOMING—The United States Atomic Energy Commission will establish a uranium ore buying station here to buy ores from the fast developing central Wyoming area.

BISBEE, ARIZONA—The Arizona Materials Service Company is revamping the old Shattuck-Denn copper flotation mill here to treat 5000 tons of manganese ore daily. Ore will be open pitted six miles south of Tombstone.

HENDERSON, NEVADA—Titanium Metals Corporation of America has reached its goal of 10 tons of titanium sponge per day and maintained this production rate for 30 days.

SELDOVIA, ALASKA—Kenai Chrome Company has made its first shipment, 3,000 tons, from its Red Mountain mine. The high grade ore was shipped to a government stockpile in the United States.

NEW ORLEANS, LOUISIANA—Freeport Sulphur Company will build a new nickel-cobalt pilot plant here for treating of 50 tons of Moa Bay, Cuba ore. GSA will pay up to $6,250,000 of the cost of the plant to test a new metallurgical process.

RAY, ARIZONA—Underground mining at the Ray Mines Division of Kennecott Copper Corporation will end in January with all ore coming from the open pit. The Number 2 mine has produced more than 64,000,000 tons of ore.

GRAND JUNCTION, COLORADO—Climax Uranium Company has signed a contract with the United States Atomic Energy Commission for the construction and operation of an addition to its uranium ore processing mill here.

TOLEDO, PHILIPPINE ISLANDS—Atlas Consolidated Mining and Development Corporation is making plans to increase the capacity of its copper mill to 10,000 tons daily. Originally planned for 4,000 the new plant is scheduled to start at that rate in January 1955.

KUALA LUMPUR, FEDERATION OF MALAYA—A post war tin production record of over 60,000 tons is anticipated for 1954. More mines will make the record possible. Output is from 77 dredges, 540 gravel pumps, and 75 other types of mines.

SHIPROCK, NEW MEXICO—The Navajo Uranium Division of Kerr-McGee Oil Industries, Inc. has started its new uranium mill here. This brings to nine the number of mills treating Colorado Plateau uranium ore. Two are in New Mexico.

BAKERSFIELD, CALIFORNIA—Ten uranium claims in the Miracle Hot Springs area have been sold for $300,000 to the Great Lakes Oil and Chemical Company. Down payment was $150,000 in cash.

PARADISE, NEVADA—Sonoma Quicksilver Mines Inc. is erecting a 100-ton Gould rotary furnace at the recently reopened Turrillas mercury mine. Mining will be by open pitting.

American Metal Makes New Brunswick Strike

American Metal Company and International Nickel Company of Canada, Ltd. have joined forces and have discovered what may become a major base metal district at Little River, New Brunswick, Canada. The district is 12 miles south of the important base metal holdings of the Brunswick Mining and Smelting Corporation at Bathurst.

Indications of mineralization in the heavily wooded area almost devoid of rock outcrops were found in late 1953 by an electromagnetic aerial survey made by McPhar Geophysics Ltd. using instruments developed by International Nickel. Subsequent diamond drilling from the surface has been directed by American Metals. Drilling started on June 17th and to date over 60 holes averaging just over 400 feet in depth have been finished. Drilling is now continuing at an accelerated rate under a 50,000-foot contract.

This drilling has at present indicated three ore bodies "A," "B," and "C." Ore lengths of as much as 3,600 feet with widths to 100 feet have been outlined. Mineralization shows both a zinc-lead, and a copper deposit. The combined zinc-lead averages about 15 percent with 0.01 ounce gold and 4.0 ounce silver per ton. The copper deposit averages 1.90 percent copper with very low gold, silver, lead, and zinc values. Mineralization has been described as replacement in greenstone adjacent to porphyry.

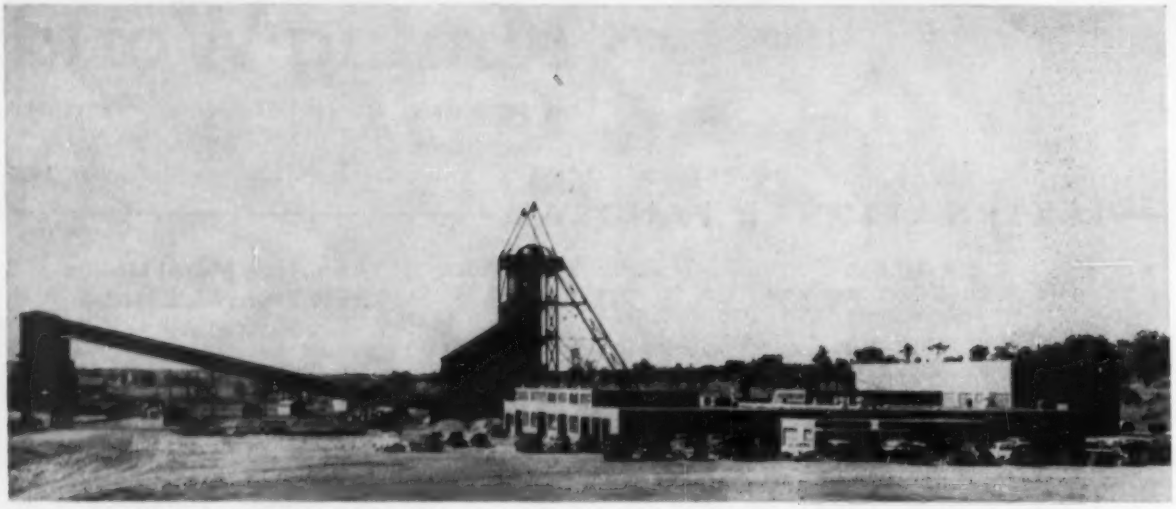
8,000 Prospectors File Kern Co. Uranium Claims

The uranium boom hit Kern County, California in October when 1,241 mining claims, nearly all for uranium, were filed at the County Clerk and Recorders office during the 20 days the office was open. This is double the September filing rate, and triple that of August.

Sale of the Miracle Mining Company's Miracle Hot Springs claims for $1,000,000 to the Wyoming Gulf Sulphur Company was the primary cause for the claim rush. (See MINING WORLD, page 95, November 1954.) There are reported to be 8,000 prospectors roaming Kern County's mountainous area each week end.

A further impetus to prospecting and mining was the announcement that the United States Atomic Energy Commission will accept uranium ore f.o.b. railroad car at Bakersfield. Starting of an ore buying station and building of a mill must wait further ore development, says the AEC.

It is only natural that so many prospectors staking so many claims would have disagreements about their rights. This has proved to be the case and many prospectors have been carrying their "45's" with them to prevent claim jumping. Sheriff's deputies patrolling the area attempt to maintain law and order.



SURFACE STRUCTURES of the new Cannon iron ore mine located on the Menominee Range near Iron River, Michigan. The front section of the first large building houses the mine office. To the right rear is the engine house. Extending from the headframe is the conveyor leading to bins from which the ore is loaded into railroad cars or trucks for stockpiling.

Sinking Thru Quicksand at Cannon

The Hanna Iron Ore Company is in the process of sinking the shaft at its new Cannon mine to an initial depth of 1,700 feet. This modern iron ore mine located on the Menominee Range three miles southeast of Iron River, Michigan, will be the largest producer on this range. The Cannon was designed for a production of 800,000 tons a year; based on a five-day week, working two shifts per day, and hoisting from a depth of 3,000 feet. Production on a limited scale is expected to be reached this year.

Some of the highlights of this story are: the use of a caisson in sinking 142 feet of glacial overburden; a unique method of using a counterweight on the sinking hoist; construction of a shaft model to aid in drilling a correct round; and a lower height headframe.

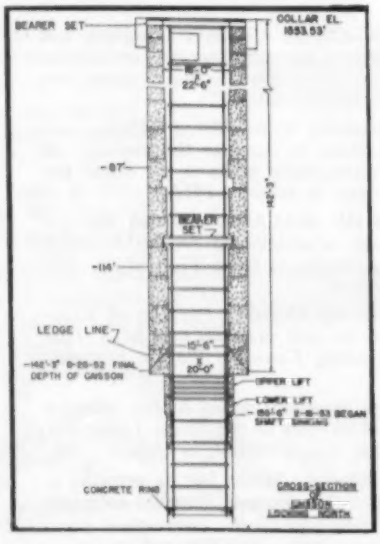
The property consists of 21 adjoining 40-acre tracts of land. Present mining is being done on a small scale through the Bengal shaft which lies 1,600 feet west of the Cannon shaft. The Bengal shaft is 900 feet deep. It was from the bottom level of this mine that a diamond drilling exploration program was carried on. The results of this program justified the Cannon mine.

The location of the shaft was picked so that costly shaft pillars of ore would not be left. To do this diamond drilling was done from the surface. A vertical hole was drilled through barren ground for 2,000 feet determining the shaft site.

142 Feet of Overburden

At the shaft site the bedrock is overlain with 142 feet of glacial drift of a very fine sandy texture. This, plus the fact that the ground water table was only 15 feet below the surface, necessitated using a caisson, or drop shaft, through this material.

To sink the shaft to bedrock the Foundation Company which has had considerable experience in this type of work was awarded the contract. In the fall of 1951 sinking operations by this company began. Initial equipment used consisted of: 1-inch-thick fabricated-steel cutting shoe for the caisson; reusable plywood forms for the outside of the caisson; reusable shiplap forms for the inside of the caisson; 1-inch-diameter bent concrete reinforcing bars, a ¾-cubic-yard mobile crane with a clamshell bucket for excavating the material from the inside of the caisson; and trucks for hauling the equipment and excavated material.



The first step in sinking was to place the cutting shoe upon the exact location of the shaft site. This was done by first excavating to a depth of 10 feet below the surface, and then installing the cutting shoe at this depth. The shoe was leveled, plywood forms assembled, and concrete poured.

Inside dimensions of the caisson were 15 feet 6 inches by 20 feet which is the outside dimension of the steel shaft sets. Wall thickness of the first segment of the caisson was 5 feet 6 inches.

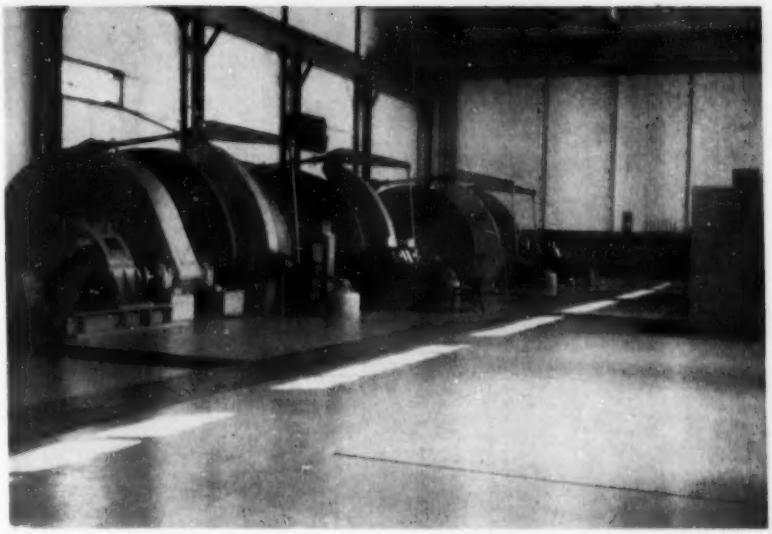
Dropping the Caisson

The ¾-cubic-yard crane removed the sand from the inside of the caisson causing the caisson to drop by its own weight. As the caisson dropped, concrete was poured into forms on the top of the preceding concrete ring in

segments of 4 to 8 feet. As sinking progressed and additional forms were poured, the wall thickness was reduced on the inside of the caisson to allow a leeway of 15 inches at the surface for aligning the shaft sets. Outside dimensions remained constant. Final thickness of the caisson collar was then 4 feet 3 inches. Sinking continued in the above manner averaging 8 feet every 10 days to a depth of 87 feet. At this depth, boulders and hardpan were encountered which caused the caisson to drop so slowly that sinking operations came to an almost complete standstill.

A deepwell pump was then installed and the shaft dewatered. Men were lowered and with the use of lightweight jackhammers and moils began breaking on the hard bottom. Broken material was excavated with the mobile crane.

Work progressed using the above method until a rush of sand, caused by the high static pressure on the outside of the caisson, entered under the cutting shoe and filled the caisson to a height of 27 feet. A second attempt was made to use the crane, but this failed when boulders under one side of the cutting shoe caused the caisson to tilt.



ENGINE HOUSE containing the skip hoist (left) and the cage hoist (right). The cage and the skip hoist are identical except that the skip hoist is powered with two 1,000-horsepower direct current motors, while the cage hoist has one.

Add Concrete Deck & Airlock

It was thus found necessary to add a concrete deck and airlock so that air pressure could be applied inside the caisson to equalize the static pressure on the outside. This deck made of steel and concrete was poured 50 feet above the cutting shoe and joined into a 3-foot-high by 14-inch-deep keyway left in the concrete for this purpose. A circular steel shaft was cast into and through the deck on the top of which was placed a decompression chamber. To add weight to the caisson to counteract the upward thrust of the compressed air sand was poured on the deck to a thickness of 29 feet.

In May 1952 compressed air was applied to the caisson which was at a depth of 114 feet. At this depth air, at a pressure of 42 pounds per square inch, was needed to balance the static water pressure. Men began working under this pressure for one hour at a time; then spending 45 minutes in the decompression chamber before leaving the caisson. After a rest of four hours the crew would re-enter the caisson. Each man worked only two hours per each 24 hours. Three crews thus totaled 6 hours on the bottom.

By the middle of September 1952 sinking had progressed to a depth of 142 feet and the caisson ledged and sealed. On October 12, 1952 the pressure deck was removed and excavation below the caisson shell commenced. No blasting was done for fear of damaging the caisson seal. All rock was removed with jackhammers and moils.

Caisson Seal Fails

On October 15, 1952, sand flowed into the shaft between the caisson seal and bedrock to a depth of five feet above the shaft bottom. To repair this opening corrugated sheet piling was driven horizontally under the seal as far as possible with an air hammer. Also, a 3-foot thick, 8-foot-high ring of concrete was poured on the inside of the caisson. This ring extended from three feet above the top of the seal to five feet below the seal. Grout pipes were installed as the concrete ring was poured. When the concrete had gained sufficient strength grout under pressure was forced into the rock walls above and below the seal. Five grout holes were also driven from the surface on the outside of the caisson. Through these five holes 920 bags of cement grout were pumped.

After grouting, the inside concrete ring was removed in sections 2 to 4 feet wide and 6 feet high. These open areas of rock under the seal were then moiled to a horizontal depth of 18 inches, and rock bolted. Forms were placed and concrete poured to fill the void. This procedure was followed until a full wall 6 feet high and 18 inches thick had been constructed under the seal. The rock under this new wall was found to be soft, so another 6 feet was moiled out and a second 18-inch wall 6 feet high was poured.

Drill Hole Dewaters Shaft

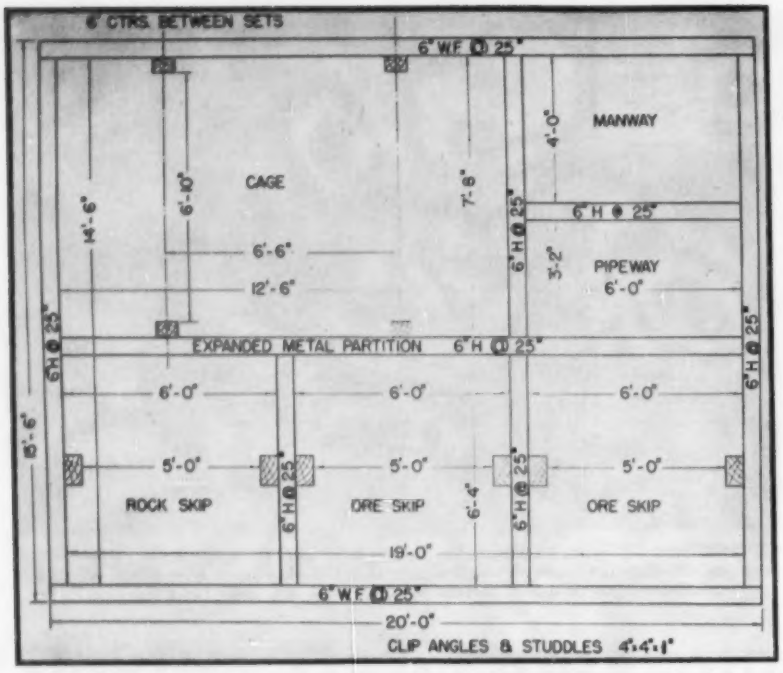
During the period between the last inflow of sand and the final placing of the 18-inch concrete wall an "NX" (3-inch) diamond drill hole was drilled vertically from the bottom of the shaft to the 6th level where it intersected a drift previously driven from the Bengal shaft. This allowed the water in the shaft to drain to the 6th level where it was pumped onto the surface through the Bengal shaft.

Shaft Sets are Hung

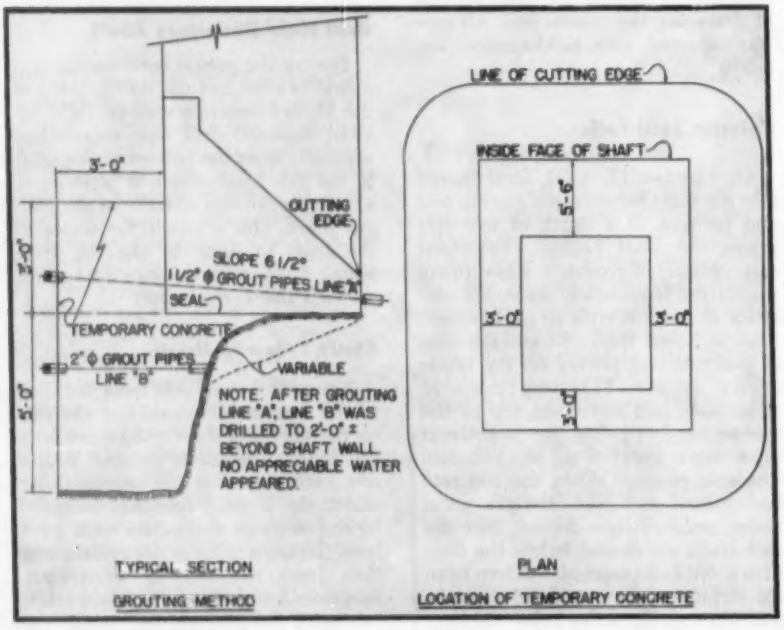
Bearer and shaft sets were installed in the caisson by assembling the sets on the surface and lowering them with the ¾-cubic-yard mobile crane. Bearer sets were placed at the caisson collar and at the keyway formerly occupied by the concrete deck. Sets were built from the keyway up to the surface and then from the keyway downward. Sets were hung at regular 6-foot intervals until the 18-inch wall under the caisson seal was reached. Five sets were then hung at intervals of 2 feet to supply additional strength to these walls.

Drilling & Blasting Begins

In February 1953 Hanna Company men began regular shaft sinking operations. To start, holes were drilled 4 feet deep and only one-third of the shaft was blasted at a time to avoid creating a large concussion which might damage the caisson seal. The



COMPARTMENT SPACING and dimensions for the new Cannon mine shaft.



above method was followed to a depth of 177 feet before using a full round.

Drilling was with 55-pound jackhammers using 1-inch hexagonal steel and 1¾-inch tungsten carbide-insert bits. When extremely hard zones were encountered, two 35-pound weights were attached to the drill.

Drill holes were loaded with 1¼- by 8-inch sticks of 40 percent Special Gelex powder. Detonation was electrical using a 220-volt parallel circuit and millisecond and regular delay caps.

For mucking, a ¾-cubic yard Hydro-mucker was used. The Hydro-mucker dumped into a 1-cubic yard rock tray that, in turn, dumped into a car on the sinking cage.

In the first 500 feet of drilling and blasting, fairly soft iron formations and slates were encountered. The V-cut round used for this type of ground consisted of 84 holes of which four were 4 feet in depth for the center V, followed by 16 6-foot-deep holes on a V pattern; then 16 10-foot-deep holes similarly inclined; and 48 8-foot holes drilled vertical, or nearly vertical.

After the first 500 feet had been sunk, harder formations were encountered and the drilling pattern was changed to a 100-hole V-cut round, drilling 8 feet and pulling 7½ feet.

The average rate of advance, including hanging sets, concreting and lathing using an 8 man crew (includes foreman) on each of three shifts was about 80 feet per month working on a five day per week basis. Average time required to complete the different steps was:

Drilling time	4½ hours
Loading, Firing, and Smoke delay	2½ hours
Mucking	12 hours
Assembling shaft sets on 6 foot centers (per set)	7½ hours
Bagging, form time, and concreting every third ring to the wall rock	4 hours

Each time a round was blasted the "NX" diamond drill hole that was used for dewatering would become plugged. Usually it was unplugged by one of the following methods:

1. Compressed air blow pipe
2. Drill rods and a jackhammer
3. Plunger and 12-round hammer
4. Light blasting

As sinking continued beyond the 6th level, air-sump pumps were used to pump to the intermediate (electrified) pumping stations cut into the side of the shaft. From the intermediate stations the water was pumped to the 6th level. The pumping system is completely automatic, each pump having a flooded suction inlet. Over week ends pumping is done with an electric deep well pump equipped with automatic controls. Average rate of inflow encountered in the shaft was 200 gallons per minute.

To aid the shaft sinking crews in drilling a correct shaft round, two shaft sets were assembled on the surface and covered with chicken wire. Loading sticks were cut into the correct lengths and inserted in the proper place in the wire representing the drill holes. This enabled all concerned to see exactly what the round they were to drill should look like.

Sinking with Counterweight

The shaft was sunk to a depth of 900 feet using a temporary headframe and hoist before installation of the permanent headframe and hoists were completed. The temporary hoist con-

sisted of a single 9-foot diameter drum and a 25-horsepower motor. The motor was not large enough to handle the unbalanced cage and car, so Hanna engineers devised an ingenious method of using a counterweight, as shown in the accompanying drawing.

The problem was not simply to attach a weight to put the cage in balance, but to arrange the counterweight so it would not extend to the bottom of the shaft where men were working when the cage was on the surface. To overcome this a small winch hoist was installed on the opposite side of the shaft from the other hoist. The end of the rope that would ordinarily be attached to the counterweight was passed through a 4-foot sheave at the top of the counterweight and then over another 4-foot sheave at the shaft collar and on to the winch hoist. The small winch hoist is used only for a rope storage drum. As sinking advanced additional rope was unwound.

Installed in this manner the counterweight moved only one-half the distance that the cage traveled. The minimum lift was 155 feet so the weight never came closer than 77½ feet to the bottom of the shaft. The weight of the counterweight was twice that of the cage and rode the runners in the rock skip compartment.

Six-Compartment Shaft

The overall outside measurements of the six-compartment shaft is 15 feet 6 inches by 20 feet. The shaft consists of three skip compartments each measuring 6 feet by 6 feet 4 inches; one cage compartment 12 feet 6 inches by 7 feet 8 inches; a manway measuring 4 by 6 feet, and a pipeway 3 feet 2 inches by 6 feet.

CANNON RESPONSIBILITIES, of which there are many, are ably shouldered by these three men: G. A. Koehler, superintendent (left), R. Whitman, operating engineer (center), and H. Krans, head mine captain (right).

25-Pound Shaft Sets

Steel shaft sets are 6-inch, 25 pound per foot "H" sections hung on 6-foot centers. Studdles and clip angles are 4- by 4- by ⅝ inch angle iron. Every third shaft set is supported by a ring of concrete. Intermediate sets are blocked with bagged concrete supported on steel hangers.

The cage will ride on four runners each measuring 5 by 7½ inches. Skips will ride on two runners, 6 by 10 inches.

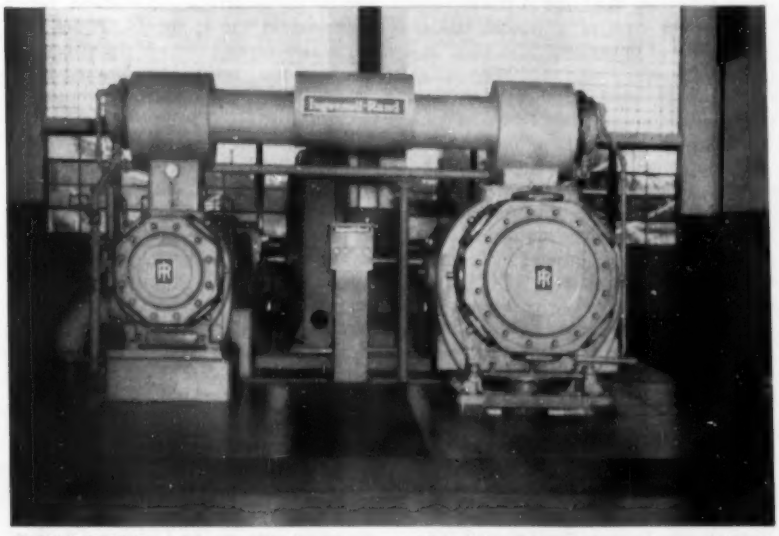
Lap joint concrete lath in widths of from 6 to 10 inches are set in the "H" beams and form the lining for the shaft. Behind this lath the voids are filled with split cedar lagging. Skip compartments are separated from the cage compartment with number nine gauge, flattened, galvanized expanded metal clamped to steel.

Headframe

In designing the headframe for the Cannon mine, practices differed from those of the common headframe design of Lake Superior iron mines. The common design is for the headframe to be built high enough to contain a loading pocket. Hanna engineers found that it was more economical for their installation to construct a low headframe with a belt conveyor leading to an adjacent loading pocket.

The Cannon headframe is a six-post type, steel frame of minimum height governed by the height of the skip in the dumping position and allowance for overtravel.

Kimberly-type skips will be used. This again differs from the recent trend of Lake Superior iron mines which has been toward the use of bottom dump skips. The Cannon mine ore is of a fairly rubbly nature, therefore the scouring action obtained with a bottom dump skip is not necessary as it is when hoisting sticky ore. Little if any trouble is expected with ore caking on the bottom of the skip. The simple, rugged, easily maintained turn-over skip was chosen for the initial production from the standpoint of initial cost and maintenance cost. The head frame is designed to accommodate either type of skip.

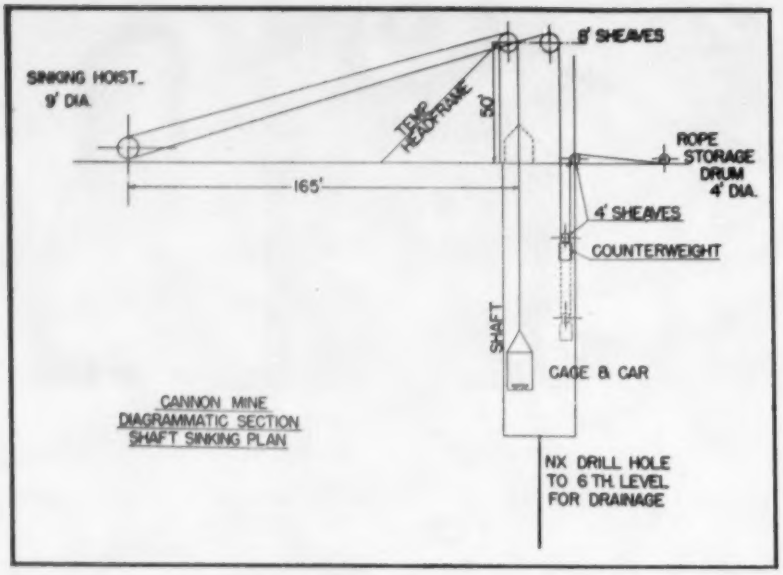


COMPRESSED AIR is supplied with two 3,000-cubic-foot-per-minute Ingersoll-Rand compressors, one of which is shown above. The compressors are located in the engine house. Air lines lead to the shaft through underground tunnels.

Underground Crushing Station

Lo-Head cars of 120-cubic-foot capacity will be trammed to the hoisting station with 12-ton electric locomotives. Ore cars will be dumped with pneumatically operated overhead cylinders onto an apron feeder.

The apron feeder will discharge onto a vibrating bar-type grizzly. Oversize plus-3½-inches, will drop into



a 30- by 42-inch jaw crusher set at 3½ to 4 inches. Undersize and the crushed ore will fall into a storage pocket, and then admitted to a measuring pocket for skip loading.

Loaded skips will dump into a surface pocket under which is an apron feeder discharging to a belt conveyor. This conveyor will discharge into a large pocket above the stockpile elevation. During the shipping season this hopper will dump directly into railroad cars. During the winter months the hopper will discharge into dumptor type diesel trucks for stockpiling. Only a short permanent trestle is required for this type of truck. After the area under the extreme end of the trestle becomes filled, the trucks will travel on the stockpiles.

Planning the Cannon

In planning the Cannon mine efficiency and long life were the primary objectives. Other controlling factors were convenience to operators, ease in handling supplies and equipment, accessibility to all equipment, safety provisions, simplicity of design and construction, and pleasing appearance inside and outside.

Modern Engine House

The engine house is 206 by 62 by 48 feet high, from basement to ceiling. A 40-ton overhead crane runs the full length of the building. At one end, an electrically operated door admits one railway car, further helping to install the heavy equipment.

The first floor houses the cage and skip hoist, two 3,000-cubic-foot-per-minute air compressors and the necessary transformers and electrical controls. To cut down the noise in the hoisting room (first floor), motor generator sets, and hydraulic and water circulation pumps were installed in the basement.

Cage & Rock Skip in Balance

The cage hoist is a double-drum, single-clutched, cylindrical type. Drums are 12 feet in diameter and 7 feet 6 inches in width, helically grooved for 1⅜-inch rope with a capacity of 3,300 feet in two layers. Each drum has a 13-foot diameter, 19-inch face, parallel motion, post-type brake operated hydraulically. Drums are equipped with Lilly Controllers which will prevent over-speed, over-travel, and will warn the operator when to start retarding the hoist at the top and bottom. In case of a power failure, the Lilly Controllers also set the brakes.

The cage hoist is powered with a 1,000-horsepower, direct-current motor through a single-reduction herringbone gear enabling the rope to be wound at a maximum speed of 1,500 feet per minute. The power source for this 1,000-horsepower motor is a 750-kilowatt, 900 revolution per minute generator driven with a 1,100-horsepower, 2,300-volt, synchronous, alternating-current motor.

Instead of using a counterweight to balance the cage, as is the usual practice, a rock skip will be used. When men are not being lowered or raised, any waste rock to be removed in development work will be hoisted in this skip.

The ore hoist is the same as the cage hoist, except that two 1,000-horsepower D.C. motors and two, 750-kilowatt generators are used. The generators are driven with a 1,750-horsepower, 2,300-volt induction motor. A 53-ton, 9-foot diameter fly wheel on this motor helps to eliminate the excessive power peaks.

Well Designed Buildings

The main building is "U" shaped. Each side is 221 feet 6 inches long by 61 feet 6 inches wide. The base of the "U" is 60 feet long by 40 feet wide and houses the offices.

The west wing of the building contains: the heating plant, lamp room, foremen's check station, mine captains' change room, nine foremen's change room, mine rescue station, miners' street clothes room, miners' dirty clothes room, showers, toilet facilities, laundry, and janitor's room. The miners' clean clothes, and dirty clothes rooms are heated and ventilated by two separate systems.

The east wing houses the master mechanic's office, warehouse, carpenter shop, electric shop, baking oven, steam and sand blast room, main shop room, blacksmith shop, and rock drill forging and tempering shop.

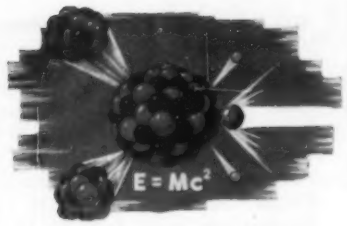
An equipment garage contains eight maintenance stalls; five for large trucks and tractors, and three smaller stalls for other mobile equipment. A partial basement provides storage space for necessary supplies. Two fireproof rooms for oil and paint storage are housed at one end of the building.

Network of Tunnels

Underground tunnels connect all of the surface structures enabling men to enter any one of the mine buildings or to go underground without being exposed to the elements. These tunnels also serve to carry the necessary steam lines, return condensate lines, water lines, air lines, and power cables.

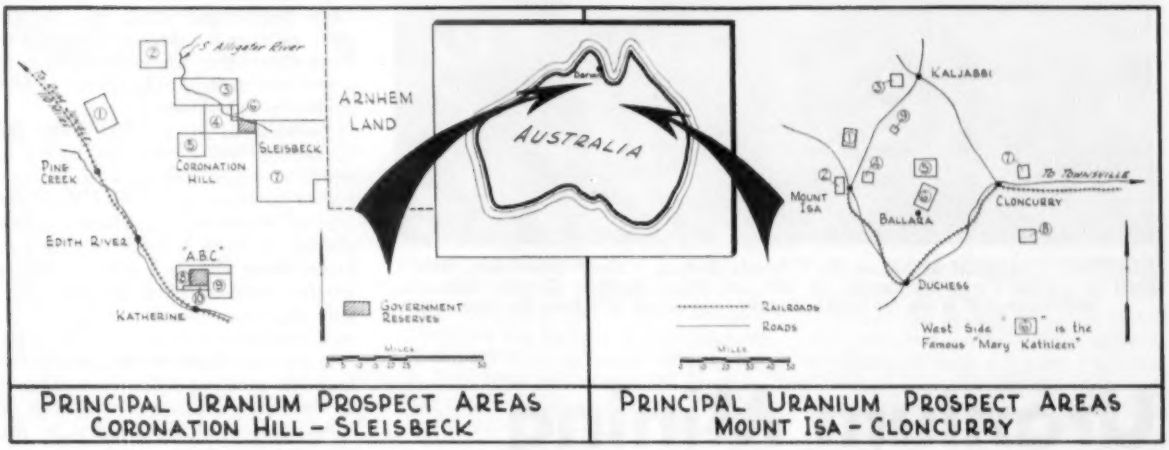
Underneath the warehouse, carpenter shop, and electric shop is a 100- by 60-foot basement connected by an underground tunnel to the shaft. Equipment can be brought from underground to this room and then elevated to the main shop room or drill shop with power cranes.

Design of the Cannon mine surface buildings was by Harold S. Starin of Duluth, Minnesota, noted architect, who has designed the surface structures at many of the Lake Superior mines. Construction of the headframe trestle, and conveyor gallery was by the Worden Allen Company of Milwaukee, Wisconsin. All other construction was by the Caspian Lumber & Coal Company of Caspian, Michigan.



FISSION FACTS

Monthly Roundup of Mining News
In the Atomic Energy Field



PRINCIPAL URANIUM PROSPECT AREAS
CORONATION HILL – SLEISBECK

PRINCIPAL URANIUM PROSPECT AREAS
MOUNT ISA – CLONCURRY

Uranium Boom Grows In Two Australian Districts

Uranium continues to dominate the Australian mining scene. A clearer picture of the ore deposits and their potentialities for economic production is now available from two areas where the most recent discoveries have been made. Listed below are descriptions of these districts, claim ownerships, and possible future plans of interested companies.

South of Rum Jungle the North Australian Uranium Corporation N. L. has reduced the area of its holdings in the Sleisbeck district following ground prospecting and airborne scintillometer surveys. The amended area covers 360 square miles. A number of diamond drill holes have been put down at "No. 4 exposure" (where the original discovery was made). Assay results show less than 0.10 percent U_3O_8 per ton for widths from eight to 35 feet at about 90 feet depth. The company states that mineralization of this grade is not rich enough to pay transportation costs to the recently opened mill at Rum Jungle. However, if sufficient tonnage can be developed a mill might be constructed near the discovery.

There are many other parts of the Sleisbeck district where ground and aerial surveys have indicated high radioactivity.

In the South Alligator River area North Australian Uranium has applied for concessions but objections to their being granted have been filed by another company.

Claim ownership in the Coronation Hill-Sleisbeck area shown in the left section of the above map is by:

1. Northern Mines Development N. L.
2. Consolidated Zinc Ltd.
3. Uranium Development & Prospecting N. L.
4. Northern Uranium Development N. L.
5. Consolidated Zinc Ltd.
6. Disputed by Northern Uranium Development and North Australian Uranium.
7. North Australian Uranium Corporation N. L.
8. Rio Tinto Ltd.
9. North Australian Uranium Corporation N. L.
10. Northern Uranium Development N. L.

Concerning the Mount Isa district, scene of the latest big Australian uranium rush, the Commonwealth of Australia Minister of Supply has stated that the full extent of the ore reserves have not been established but that when it has been shown that there are sufficient ore reserves to justify erection of a treatment plant there would be no doubt that one would be erected.

Near the middle of October, Australian Oil Exploration Ltd. stated that the company, in conjunction with Petroleum Drilling Corporation, will form a company to erect a mill near Mount Isa. Australian Oil owns the Mary Kathleen and Counter leases near Mount Isa.

A few days later, Mr. G. R. Fisher, chairman of the directors of Mount Isa Mines Ltd., reported that his company has made an offer to the Australian Atomic Energy Commission to build and operate a mill when sufficient ore has been developed in the district. It is not presently known if one or two mills will be built.

Intensive prospecting continues over a wide area in Queensland and additional companies have been formed to prospect and operate in the Mount Isa-Cloncurry area. The map above at right shows the location of the holdings of the following companies:

1. Mt. Isa Mines Limited.
2. Mt. Isa Mines Limited.
3. Uranium Holdings.
4. Australian Oil Exploration Ltd.
5. Uranium Holdings (northern section), Uranium Corporation of Australia (southeast section).
6. Australian Oil Exploration Limited (west section), United Uranium (east section).
7. Gold Mines of Australia.
8. United Uranium.
9. Cloncurry Uranium.

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DEEPEST URANIUM MINE on the Colorado Plateau is the 646-foot-deep Bowen shaft of Golden Cycle Corporation on Atkinson Mesa, Montrose County, Colorado. Shipments of Morrison ore have been made since April 1954 from the mine.

Uranium Mining

SHATTUCK-DENN SHAFT on Club Mesa, Montrose County, Colorado, is 515 feet deep. This shaft is in the heart of the Uravan Mineral Belt with regular shipments of Morrison ore being made. Ore bodies now being mined were discovered by drilling.

Goes Deeper . . .

URANIUM finding and mining on the Colorado Plateau is getting deeper. Deeper because recent exploration has outlined large high-uranium ore bodies in the older formations, such as the Shinarump and Chinle, which in many places on the Plateau are found at depths to 1,000 feet below the surface. Deeper, also, because nearly all the outcropping deposits (both Morrison and older) have been found along the canyon rims, as have the deposits adjacent to these rims which are covered by only a few tens to several hundreds of feet of overlying sedimentary rocks.

Looking at it another way, the Shinarump and Chinle ore bodies in many instances are both larger and higher in uranium content than the typical Morrison vanadium-uranium deposit so there is more incentive to probe these deeper horizons seeking greater rewards. Then too, the drillable shallower formations have been well perforated. This is particularly true for the Morrison where not too long ago prospect holes were collared in the same formation. Today it is commonplace to start holes in the overlying Dakota.

First Deep Mining At Uravan

Deeper mining, following deeper drilling, got its start in the Uravan district in Montrose County, Colorado. The reason, of course, is that this is in the heart of the Uravan Mineral Belt where large deposits had been mined for years at the Club Mesa and Dolores Bench. Both the United States Atomic Energy Commission and the United States Geological Survey concentrated some of their earlier drilling in this district—drilling further back from the rims and on higher benches, but in most cases adjacent to the known shallower deposits.

Golden Cycle Deepest

Drilling proved successful and the deepest mine on the Plateau has been shipping ore since April 1954. It is the 646-foot-deep Bowen Shaft of the Golden Cycle Corporation on Atkinson Mesa east of the Dolores Bench. Golden Cycle operates AEC Lease No. 39 comprising 92 acres where surface diamond drilling on 200-foot centers indicated important reserves.

Shaft sinking was started June 26, 1953 and completed December 22nd of that year. The two-compartment shaft has a manway and a skipway. It is 5 by 10 feet in cross section and is timbered with 4- by 8-inch cribbing. The station was cut at a depth of 635

feet and just underneath the ore horizon. All development will be under the ore with short raises driven through the ore from which open stopes are started. Drilling is with Ingersoll-Rand Jacklegs in both stopes and development headings. An Eimco 12B RockerShovel is used for drift loading. A Universal air trammer is used on the main level. Air slushers pull broken ore from stope faces into chute raises.

Ventilation is improved by a 24-inch exhaust line in the manway compartment of the shaft until an underground connection can be made with the Worcester Mines workings in the same ore horizon on the adjoining AEC lease to the west. This vent pipe was originally used in the well-known Carlton drainage tunnel at Cripple Creek. Benjamin H. Slothower is in charge of the Golden Cycle's uranium operations.

Shattuck-Denn Shaft

The second deepest vertical shaft in the Uravan Mineral Belt is that of the Shattuck-Denn Mining Company on Club Mesa west of Uravan. This 515-foot-deep, two-compartment, 4-by 8-foot, cribbed shaft is also on an AEC lease which was diamond drilled with holes on 100-foot centers.

This well-equipped mine is managed by Thomas Newell with Frank Garrett as the superintendent. Ore and waste are hoisted in a one-ton skip which dumps into a two-compartment bin in headframe. The waste is trucked to and dumped into a nearby canyon. Underground mining equipment includes a Mancha Mule, Eimco RockerShovel, air slushers, JackLegs, and Copco chisel bit carbide-tipped steel. A 6- by 9-foot drift is being driven 1,200 feet westerly to an ore body, while other deposits nearer to the shaft are being mined.

The third deep vertical shaft in the Uravan Mineral Belt is also on an AEC lease. It is that of the Worcester Mines on the Dolores Bench. Sinking of the 296-foot-deep shaft was started in July 1953 and completed in October with a station at 282 feet. Regular ore shipments have been made from this property. John Hill, who has mined uranium for 20 years, is president.

Deep Ore Different

The first thing that an old-time uranium miner notices at both Golden Cycle and Worcester mines is the difference in the ore from that mined over a period of 40 years at the nearby Dolores rim. Individual ore bodies are neither as thick nor as large as those stoped at the Ophir or Little Dick mines. The second difference is in the darker color of the ore. As one old-timer said, "This is a good stope; it looks almost the same as working in a coal mine."

Utah's Deep Uranium Mines

The deepest uranium shaft in the Big Indian District is the La Sal shaft of Homestake Mining Company which was described in the November issue of MINING WORLD, page 46. This 600-foot shaft was sunk for the mining of an ore body discovered at the base of the Chinle by diamond drilling.

CAL URANIUM COMPANY'S San Juan Shaft was the first deep shaft in Utah's Big Indian district. This shaft cuts the Chinle at a depth of 280 feet. It was started in October 1953.

HOMESTAKE MINING COMPANY'S La Sal Shaft is now the deepest in Utah's Big Indian district. The 600-foot-deep shaft was completed late in November to the Chinle ore horizon.

THIRD DEEPEST Uravan Mineral Belt shaft is 296 feet deep. It was sunk by the Worcester Mines on the Dolores Bench west of Golden Cycle's Bowen Shaft. Sinking of this shaft was started in July 1953 and completed in October.

Cal Uranium Company's San Juan shaft in the Big Indian district was the first deep Plateau shaft in Utah. This 280-foot shaft was started in October 1953, finished early in 1954, and shipments of 50 to 60 tons of ore per day have regularly been made.

In the Marysvale district of Piute County, the Vanadium Corporation of America's three-compartment, vertical Freedom shaft reaches mine workings 800 feet deep. A crosscut reaches both the Freedom and Prospector veins which have been extensively developed. Bullion-Monarch ground adjoining Freedom is now being developed at depth. The Marysvale district is not typical of the Plateau deposits in that pitchblende is found in a series of narrow steep dipping shear zones, fractures, and veins cutting quartz monzonite. See MINING WORLD, July 1950, pages 10 to 13.

What About New Areas?

So much for today's deep mines. The important thing to remember is that the Uravan deep mines may be considered as extensions of large and well known mineralized areas.

Homestake's La Sal operation, as well as that of the Cal Uranium Company, is a logical development following Charlie Steen's discovery of the rich Mi Vida mine only a few miles to the southeast. All ore is in the Chinle. These mines are the best examples of the deeper mines mentioned in the first paragraph.

Deeper drilling for both Morrison and Chinle ore continues at a rapid rate in many widely scattering Plateau districts. This means just one thing—it will take larger and/or richer ore bodies to warrant this deep mining. In several areas holes have found mineralization in the Morrison formation at depths to 1,000 feet. In the Morrison, experience has shown that it takes lots of holes to delimit a uranium ore body. AEC drilling of this formation varies from 200- to 25-foot centers, will probably average 50, and may be considered as adequate at that spacing.

These deeper holes cost money, real money below 800 feet where only 20 feet of hole can be drilled per day at a cost of $7.00 per foot. When you spend that kind of money for a deep hole you had better get a core so you can be sure what's down there. This means that diamond drilling, the most expensive of the current methods of drilling on the Plateau, must be used. However, by plugging to the top of the ore formation overall cost of these deep holes can be held to $4.00 per foot.

MANAGER OF THE deepest uranium mine on the Colorado Plateau is Benjamin H. Slothower pictured beside the Bowen Shaft of Golden Cycle Corporation. The shaft is five miles from Uravan, Colorado.

VANADIUM CORPORATION OF AMERICA'S Freedom shaft in the Marysvale district of Piute County develops uranium-bearing veins and fractures in quartz monozite. Freedom workings are now 800 feet deep.

With small ore bodies the rule in the Morrison—in the 5,000- to 10,000-ton range—it takes only a little figuring to prove that mining of these ore bodies at a profit presents many problems.

The mere discovery of good grade mineralization in a deep hole, or in a dozen deep holes on 50-foot centers, doesn't mean that there can be a profitable mine.

The accompanying box shows some of the economic problems of deep uranium mining.

If, as has been the case in several instances, that drilling hit all the ore in the highest grade and thickest section, only 60 percent of the indicated tonnage might be mined. On the 20,400 tons of the 0.35 percent ore, the indicated profit per ton is $18.26 so a few thousand dollars profit would result.

Importance of high-grade ore, particularly in depth, is brought out very sharply by these figures. It should be noted that the day is about passed on the Plateau when it is possible to go out and locate claims on open ground; that is, acquire an area at minimum cost. Purchase payments and/or royalties adversely affect the estimates given above.

There is no easy way to minimize the problems. Mining costs, in nearly every case, will first appear to be and actually are high due to the erratic nature of the ore bodies.

Experience and judgment of the geologists and engineers is of greatest importance. Note that generally the holes would be spaced at more than 50 feet. In well-mineralized areas, this can and has meant important ore bodies between the holes. It has saved more than one operator.

The newer districts, and fringe mineralized areas, are less well known. The problems there are even tougher.

Basic Economics of Deep Uranium Mining

To better understand the problems being faced today by engineers in evaluating uranium found in the Morrison formation by deep diamond drilling let's set up two hypothetical ore bodies and make the following calculations.

Two Better-Than-Average Ore Bodies

Surface diamond drilling on 50-foot centers has fully blocked out two ore bodies at an average depth of 800 feet. Ore body "A" is the larger and is 150 feet wide, 400 feet long, and averages 6 feet thick. It contains 25,600 tons of ore. Some 900 feet away is a smaller ore body "B." It is thinner, 4 feet; narrower, 60 feet; and longer, 500 feet. The size and shape complicates mining and increases costs of development. "B" contains 8,900 tons of ore.

What Will Development and Mining Costs Be?

It will take a central, three-compartment shaft 800 feet deep to reach the ore horizon. The mine is far from electric power, cities, and water. A complete camp, electric power plant, and mine surface plant must be purchased, trucked to the site, and erected.

Capital expenditures would be about as follows:

EXPLORATION by diamond drill holes on 50-foot centers:	
"A" 36 800-foot holes @ $4.00 per foot	$115,000[1]
"B" 22 800-foot holes @ $4.00 per foot	70,400
CAMP ESTABLISHMENT	7,000
SURFACE PLANT (headframe, compressor, warehouse, dry, office, storage tanks, etc.)	8,000
SURFACE EQUIPMENT (Diesel compressor, Diesel-electric plant, Diesel-powered hoist, etc.)	18,000
SHAFT 800 feet @ $125.00 per foot	100,000
MINE EQUIPMENT (rock drills, cars, mucking machine, trammer, slushers, etc.)	8,000
CROSSCUTS AND DRIFTS (1,400 feet @ $20.00 per foot)	28,000
Total	$354,400[2]

1. This is average estimate. Includes wildcat holes to discover ore body. With luck, fewer holes on wider drilling pattern would probably outline a continuous ore body. This cost is not applicable in the case of AEC leases, but 15 percent royalty applies there so finding cost in either instance is large.

Value Of and Cost To Mine 1.0 Ton of Ore

Analysis of drill hole data has indicated that the average grade of ore as it is shipped will be 0.35 percent U_3O_8 which is about the average of Colorado Plateau production at present time according to industry guesses.

Each ton of ore would then have a value as follows:

ADD INCOME	
Sale price of 1.0 dry ton of 0.35 percent U_3O_8 ore	$30.25*
Initial bonus ($35,000 for 34,500 tons) per ton	1.01**
Total	$31.26
DEDUCT COSTS	
Haulage costs in excess of government allowance	$1.00
	30.26
Mining Costs	12.00†
Lime penalty	0.0
INDICATED PROFIT per ton before taxes, interest, amortization, depreciation, and depletion.	$18.26

Why High-Grade Ore is Important

It would cost just as much to find and mine the ore bodies if they were either higher or lower in grade. If higher, more profit, but it takes only a slightly lower grade to make the operation marginal. At 0.27 percent U_3O_8, a break-even operation is indicated. At that grade, income per ton would be $23.66 and costs $13.00, leaving net income at $10.66 per ton which on the 34,500 tons equals $367,770 or just enough to amortize expenses.

2. Note that no purchase price for claims has been figured.
* This includes the base price, premium, and development allowance.
** This is initial production bonus on first 10,000 pounds of U_3O_8 figured against total tonnage.
† Includes overhead, engineering, legal fees, etc.

LARCEST TUNGSTEN MINE in Korea is the Sang Dong. This mine has important reserves of both tungsten and bismuth

Tungsten—Key to South Korea's Mining

BY FRANK A. CRAMPTON

Within South Korea is probably one of the greatest and most diversified concentrations of mineral resources yet found in any area of equal size in the world—36,239 square miles. The area equals that of Indiana, and is less than one fourth the size of California.

Contrary to the general conception, (with the exception of coal which is for the most part of inferior grade, and the iron ore limonite) known mineral resources are greater in South Korea than in the north. The industrial minerals, tungsten, tin, iron, pyrite, manganese, molybdenum, titanium, copper, lead, and zinc are more than sufficient to supply local demands, without much further exploration, for the next 50 years. The present developed potential is greater than that required to sustain the industrial development of South Korea before World War II under the Japanese, or even planned by them to maintain the war and industrial economy. There should be considerable tonnages, in excess of domestic requirements, available for export to favorable markets.

Crampton and Crampton, Willows, California
Advisor to the Minister of Commerce and Industry Republic of Korea, April 1953 to May 1954

Tungsten, monazite, columbite, crystalline graphite, fluorite, beryl, and bismuth are abundant and should become important factors in world markets when the mines are fully developed. Nickel, cobalt, potash, and sulphur are found in some of the undeveloped prospects and, although it is probable all domestic demands will be met, it is not anticipated that there will be any surplus of these for export.

Phosphate rock has not been developed, although apatite occurs in almost every province. It is probable that, as in the case of tin, the Japanese overlooked this source for fertilizer. Radioactive ores have been found, but the deposits are yet to be explored to determine their extent and commercial possibilities. Clays are superior, and are mostly exported to Japan for making the fine porcelains for which the Japanese are famous.

101 Tungsten Mines

Tungsten ores, mainly wolframite and scheelite, are found in all provinces; however, of the 101 mines which have produced tungsten 82 are concentrated in Kwang Won and Chung Chong Puk provinces in the central-western part of the peninsula. Of these, the Sang Dong, about 100 miles east of Seoul, is reputed to be the largest producing tungsten mine of the world. The Ok Bong, 15 miles southwest of the Sang Dong, is credited with ore deposits of equal magnitude; however, this mine is not equipped with modern machinery as is the Sang Dong and production has been low.

When the Sang Dong and Dal Sung mines are developed and modern equipment is installed, the combined production of tungsten concentrates should exceed 30,000 metric tons annually. These mines, with the others known to be capable of producing large tonnages, will place South Korea in a position to dominate world markets. Transportation is not a serious problem anywhere in Korea, and compares favorably with the facilities that existed in the western mining states until about 1920. Labor costs are low, and the character of the deposits assures low cost production.

Bismuth is a byproduct of most Korean tungsten ores, and the Sang Dong produced 600 tons of 30 percent Bi concentrate in 1953. The Japanese overlooked bismuth as a byproduct of tungsten ores, as well as the bismuth deposits. Bismuth is found in several localities in the form of bismuthinite. Development of the more promising bismuth prospects is contemplated, and from these mines the bismuth recovered, together with that from the tungsten mines, would prob-

ably be sufficient to meet present world demands for this metal.

Molybdenum occurs in the ores of most of the tungsten mines, and plans have been made to build a plant to eliminate this deleterious element.

Cassiterite Found In 1953

Tin will undoubtedly be an important factor in the mining and industrial future of South Korea. In June 1952 cassiterite was identified in ore from the Samgunni mine, near the east coast in Kwang Won province, about 30 miles west of Ulchin. The most remarkable feature in regard to the tin deposit is that the Japanese failed to recognize the ore, and had prospected the deposit for iron. Nearby was a copper mine; within a half mile, the Ulchin high-grade lepidolite mine; and, within two miles, the Kum San and Dae Hing tungsten mines, all in production. That Japanese engineers failed to recognize cassiterite is not easily understood.

The deposit is of such extent and persistence as to indicate it to be of major importance. Cassiterite is found on both sides of the contact of massive granite and slate for a distance of three quarters of a mile. The average mineralized width is 250 feet, and at the contact there occurs a well defined concentration about 12 feet wide for the full distance of the exposure. The highest outcrop is 1,200 feet above an adjacent stream bed. Two streams that intersect the deposit have heavy placer concentrations of the mineral.

Since tin ore was identified at the Samgunni, similar ore has been brought to Seoul for identification; several samples contained cassiterite. While exploration is required to determine the extent of the deposits, it is certain that South Korea can supply tin in quantities of importance to the world markets.

Monazite is found in large deposits in Chol La Puk, Chung Chong Nam, and Kyong Gi provinces, on the west coast south of Seoul. Operation and development of the deposits has been curtailed because mining interferes with agriculture. This obstacle is gradually being overcome and equipment to modernize operations is being installed. The large Miho placer, in Chung Chong Nam, has installed magnetic separators and increased production as well as the grade of concentrates.

Columbite Potential

Columbite is found at the Mooju mine, and at the Telpan, in the Jun Puk area, beryl and gold are also recovered from these deposits. The properties were idle in 1953 although about one metric ton was hand-re-

Important Mines of the Korean Republic

Tungsten Mines

*1 Sangdong mine, 5,600,000 metric tons 1.3% WO_3 ore reserve.
*2 Dalsung mine, 800,000 metric tons 0.35% WO_3 ore reserve.
*3 Chung Yang mine, 147,000 metric tons 0.40% WO_3 ore reserve.
*4 Okbang mine, 150,000 metric tons 1.50% WO_3 ore reserve.
*5 Wolak mine, 150,000 metric tons 1.50% WO_3 ore reserve.
*6 Namyang mine, 32,000 metric tons 1.0% WO_3 ore reserve.
*7 Daewha mine, 100,000 metric tons 1.0% WO_3 ore reserve.
*8 Yoopung mine, 50,000 metric tons 1.0% WO_3 ore reserve.
*9 Kwang Chun mine, 50,000 metric tons 1.0% WO_3 ore reserve.
*10 Kumsan mine, 30,000 metric tons 1.0% WO_3 ore reserve.

In addition to those mines shown there are five other known tungsten deposits in Kyong Gi Do Province, 37 in Kang Won Do, nine in Kyong Sang Puk Do, three in Kyung Sang Nam Do, 39 in Chung Chong Puk Do, and three in Chung Chong Nam Do which are not shown because of lack of map space.

Copper Mines

Largest copper mines, ore reserves and grades are: Ilkang mine, 300,000 metric tons 6.0% Cu; Soonchun mine, 200,000 2.0%; Kosung mine, 200,000 1.0%; Goonpuk mine, 115,000 2.0%; and Daldung mine, 100,000 1.0%.

Lead Mines

Largest lead mines, ore reserves and grades are: Tadok mine and Bongmyung mines, each with 40,000 metric tons 3.0% Pb; Heju mine, 324,000 3.0%; and Namhe mine, 300,000 3.0%.

KUBONG GOLD MINE of the Korea Mining Development Company is developed through a series of adits. Over 600 men are employed at this mine which has been in operation for more than 20 years. Ore averages 0.29 ounce gold per ton.

covered from each. Concentrates averaged 56.0 percent Cb_2O_5 and 19.0 percent Ta_2O_5. Preliminary assays indicate that the deposits average about 0.25 percent Cb_2O_5 and 0.11 percent Ta_2O_5.

Crystalline graphite, equal or superior to that offered on the world markets, is found principally in Kyong Gi, Chung Chong Puk, Kang Won, and Kyong Snag Puk provinces, although undeveloped prospects in all other provinces account for a very small production. Japan is the principal buyer. Production has been seriously curtailed because of damage to mines and equipment during Communist invasions. Peak Japanese production was 300 metric tons a month, but can be increased many times that amount with the installation of modern equipment. Production in 1953 was 50 metric tons a month by crude hand methods.

Manganese occurs in the east coast provinces of Kynog Sang Nam, Kyong Sang Puk, and Kang Won. The production potential is much greater than at present, equipment is not available for increasing the Mn content to acceptable market standards. The higher grade ores average between 35 and 40 percent Mn, somewhat below the minimum required by American users, although Japan purchases ore or concentrates as low as 30 percent Mn.

Fluorite Reserves Large

Fluorite is found in Kyong Gi, and Chung Chong Puk provinces. Production decreased from the peak of 60,000 metric tons attained by the Japanese, to 11,000 in 1953, largely because of the destruction resulting from war and invasions. Concentrates average 80 percent CaF_2 or better. Rehabilitation and modern equipment will result in production reaching upwards of 100,000 metric tons annually all of the ceramic grades, and a considerable part of the metallurgical and acid grades, although appreciable tonnages could be made available for export.

The largest pyrite mines are in Kang Won province and straddle the "peace," line. The probability of operating these mines successfully before final peace is assured is remote. There are, however, commercial deposits of some magnitude in Chung Chong Puk and Kyong Sang Nam provinces from which sufficient ore can be mined for South Korea's industrial requirements. Promising pyrite prospects are found in other provinces and if increased domestic and foreign demands indicate that mining would be profitable, their development would assure additional tonnages.

Importance of Tungsten

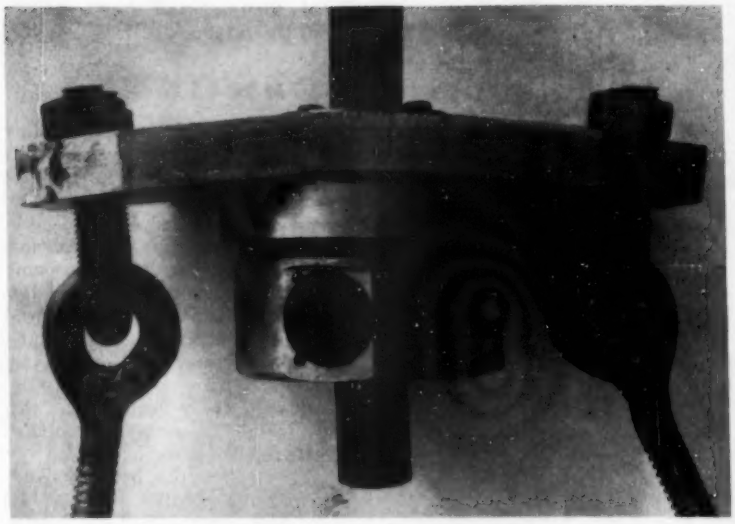
The trend of Japanese production from 1930 through 1944 indicates the importance Japan attached to the manganese, iron, and fluorite deposits, to which the major part of equipment was transferred when World War II was declared. In 1946, when the war was ended, production was at a virtual standstill; some improvement was noted by 1949 but the Communist invasions resulted in further delay and destruction. In 1953 mine production increased to the point beyond which it cannot go much further until a firm program for development, reconstruction, and installation of mining equipment is undertaken. The termination of the tungsten purchase contract with the United States reduces the annual export income of South Korea to about $12,000,000 from $37,000,000 and withdraws money that had been earmarked for mining and industrial recovery. The several foreign aid agencies have not been agreeable to allocations sufficient to reestablish mining or industry to the level that would afford to South Korea a firmly established national economy. However it is probable that some arrangements can be made whereby the mines can be reopened and developed with modern equipment. Meanwhile, of the two hundred possible large producing mines, all but about 10 must continue operating by primitive hand methods, including breaking rock by fire and water.

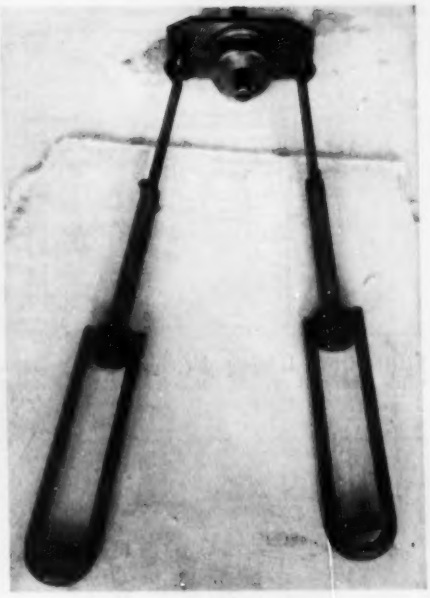
The great mineral resources of South Korea are so large and diversified that the assurance of its becoming an industrial country is beyond question. Korean mining engineers, educated in the United States, are capable and efficient. Several groups have already been formed and, if encouraged with assurance that United States buyers will purchase their mine products, are ready to proceed with the necessary mine development without waiting for assistance from the aid agencies that do not understand and realize the mining and industrial potential or problems.

Trend of Mineral Production in South Korea Measured in Metric Tons From 1930 to 1954

Product	*First Mined*	*1930*	*1940*	*1944*	*1946*	*1949*	*1953*
Tungsten (60% WO_3)	1930	5	1,813	2,968	376	1,376	7,441
Bismuth (30% Bi)	1948					196	655
Tin	1953						7.5
Manganese (40% Mn)	1938	0	486	23,979	0	100	3,058
Fluorite (80% CaF_2)	?	1,815	21,366	59,800	0	1,560	11,012
Pyrite (40% S)	1930	4	16,154	18,942	0	0	1,066
Iron (Plus-50%-Fe)	?	70,822	154,502	441,941	0	0	16,777
Crystalline Graphite	?	3,667	3,063	204	204	803	683
Monazite (30% R_2O_3)	1943			150			766
Columbite*	?						1,100

*Columbite measured in kilograms.





PHOTOGRAPH NO. 2 (above) shows how the steel backing plate bent under a test load of 20.25 tons with the E drill rod slipping in the chuck. PHOTOGRAPH NO. 1 (right) is the test unit with turnbuckle extended.

Safety Rig Proves Successful Under 10,000 Pounds Pressure

By W. H. ADDISON AND R. G. WEAVIND

Recently, members of the engineering staff of the Diamond Research Laboratory in Johannesburg, Union of South Africa, were requested to investigate and develop an idea for a more suitable safety rig to be used with diamond drilling machinery in the gold fields of the Orange Free State. Pilot hole diamond drilling in these fields was being undertaken to locate possible water-bearing fissures. The idea for the safety rig originated with the chief engineer in charge of drilling.

Bit Pressure 10,000 Pounds

The diamond crowns used in the Free State are of the "EX" size. At present, drilling is being undertaken at depths to 5,300 feet and it is likely that at a later date this depth will be exceeded by 700 to 1,000 feet. At 6,000 feet it is expected that water pressures will be in the region of 2,600 pounds per square inch. Translating this pressure to the cross sectional area of an EX noncoring crown means that the static load on the face of the crown could approach 4,600 pounds at 6,000 feet. With the possibility of water hammer and gas pressures to be considered, it is expected that the load may reach 10,000 pounds. (See articles on Free State Geduld No. 2 shaft: March 1953, pages 47, 85; September 1953, page 67.)

As a matter of interest, it has been found that holes drilled into water-bearing fissures at 4,000 feet have indicated pressures in excess of the normal static head because of gas pressure. Rates of flow in excess of 40,000 gallons per hour have also been encountered. It will be seen that some form of safety rig is an urgent necessity.

The diamond drills in use at the time of the investigation were very cumbersome and had several disadvantages, among others, the fact that they were attached to the casing pipe, and necessitated the drill being at least eight feet from the face.

Turnbuckle on Safety Plate

It was suggested that the improved machine should be quite independent of the Jack bars, drill bars, or casing pipe and that the safety chuck should be attached to a plate which could be drawn forward by two independently grouted turnbuckles as the drill rod advances.

Figure No. 1 shows the assembly which is used at present. In this photograph, a box girder is seen which is held in position by two 1¼-inch wedge bolts 46 inches long grouted into the face. The purpose of this girder is to hold the casing pipe in place. Figure No. 2 shows the suggested modification which was made by the chief engineer of the drilling company. The box girder remains as before except that one of the pressure valves has been moved to a position behind the girder. The rea-

Mr. Addison and Mr. Weavind are associated with the Diamond Research Laboratory in Johannesburg, Union of South Africa

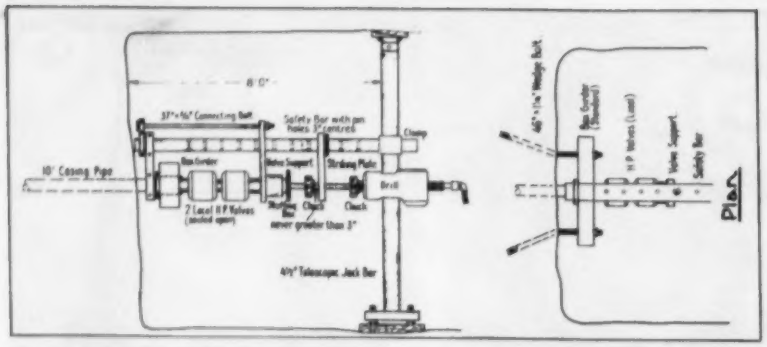


FIGURE NO. 1, box girder type assembly originally used to hold casing pipe in place while diamond drilling for water bearing fissures in which water pressures may reach 2,600 pounds per square inch.

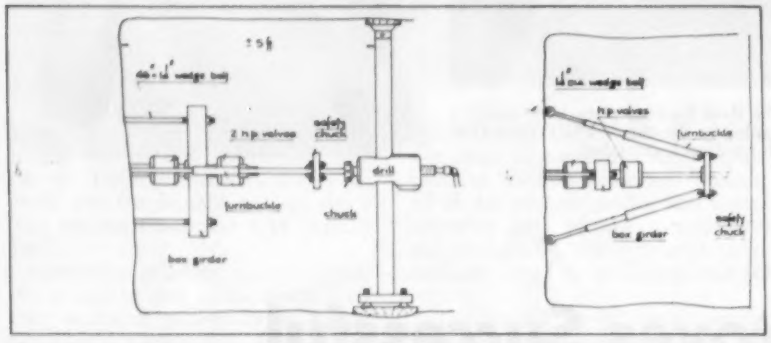


FIGURE NO. 2, the new safety rig to hold the casing pipe in place by valve and box girder. In this case the pipe is not grouted in place but rubber seals are used for waterproof joint.

son for this is twofold: first, the valve is better protected, and second, should the casing pipe by any chance tend to move under pressure it will be held in place by the valve and box girder. The second reason becomes especially important if the casing pipe is sealed by rubber seals only, and is not grouted in with cement.

The suggested safety rig is mounted in such a way that as the safety chuck moves forward with the drill rod, the two turnbuckles are turned so that the plate behind this chuck is always hard up against it. In order to keep the drill as near as possible to the rock face, the Diamond Research Laboratory designed the turnbuckles to be only 21 inches long when closed and 45 inches long when fully extended. Figure No. 3 shows the design of the turnbuckles.

Tested at 20.25 Tons

In order to ascertain whether this new type of safety rig would be of adequate strength to withstand the high pressures produced when water is encountered, a complete unit was made by a local company following the Laboratory's design. This unit consisted of a modified chuck, the steel backing plate, and the two turnbuckles as mentioned above. Photograph No. 1 shows the completed unit closed.

This unit, fully extended, was tested under laboratory conditions with the following results:

At 14.6 tons the backing plate began to bend slightly.

At 15.0 tons the drill rod began to slip in the chuck. The chuck was then tightened up as much as possible.

At 20.25 tons the test was stopped because the E drill rod was again found to be slipping in the chuck. Photograph No. 2 shows the unit after the test.

As mentioned previously, it is estimated that in practice the safety rig will only have to withstand pressures in the order of five tons when the normal "EX" bit is used; hence, the rig is adequate for the purpose.

It was found that after the test, the ¾-inch high tensile rods in the turnbuckles had not been stretched to their elastic limit and that they could be screwed back for their entire lengths. The 5/16-inch-diameter drill rods in the turnbuckles had, however, been stretched to very near their elastic limits; permanent deformation resulted and they could be screwed back for only about ¾ of their entire length.

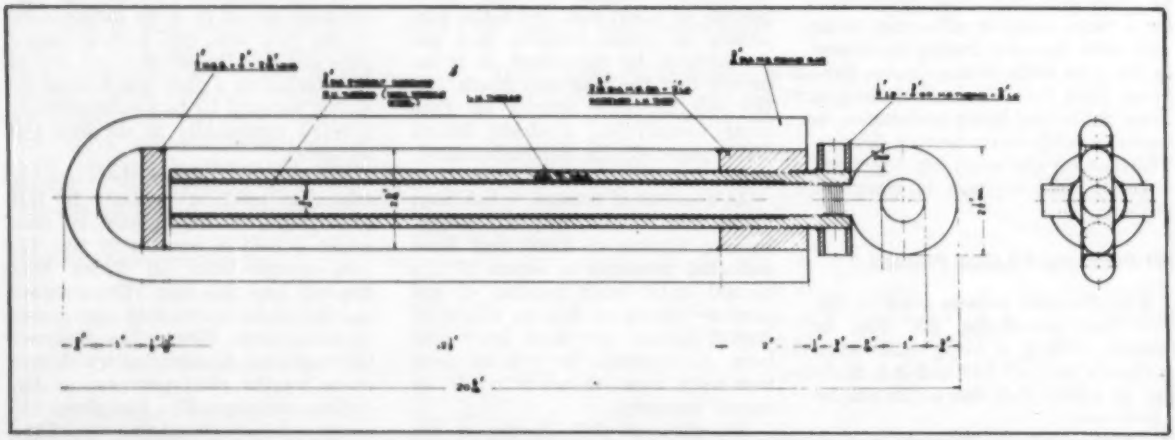


FIGURE NO. 3, special turnbuckles are used to keep the drill as close to the rock face as possible. The turnbuckles were designed by the Diamond Research Laboratory and are 21 inches long in the closed position and open to 45.

"Say, what's wrong with my mine cable?"

"Lots of times we find cable sections like this—necked-down. And that's only one of our troubles. Our cables short out too often. Sometimes jackets creep back from splices. Other times we find broken ground wires. What in thunder are we doing wrong?"

"Well, here's a big part of your trouble:"

"Hourglass sections are a sure sign of too much tension on the cable. So are the other troubles you mention. To end tension . . . keep spring-type shocks at the power source. Keep the reel pulling evenly. Adjust it so there's no back-spooling. Watch out for kinks. And be sure you use a cable that can take it when the going gets tough. Then you'll put an end to your trouble and keep your cables on the job far longer. And remember, one break costs more than the difference in price between a cheap cable and a quality one!"

Be sure with Anaconda's new shuttle car cable

Are cables all alike? No! Quality cables — like ANACONDA's Securityflex* — have proved themselves over the years. Here's why ANACONDA Cables last longer and are safer. The ground wire can stretch more. It will *not* break before the power conductors. *That's a real safety feature.* Jacket is made of a new Neoprene formula. It is stronger. Insulation is long-life, tough cold rubber. It all adds up to real economy *in use.* Get the full facts from your Anaconda Representative. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

*Trade Mark

64287

the right cable for the job

ANACONDA®

WIRE AND CABLE

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. . . the leading name in the development of MAGNETIC SEPARATORS for TACONITE CONCENTRATION

Back in 1943, Dings Magnetic Separator Company experience and equipment was instrumental in helping to develop the commercial flow sheet that is being used by today's large taconite operators.

In 1947, Dings furnished the first high intensity "cobbing" separators to handle ball and rod mill feeds which precede the finisher separators.

This continuing research and field engineering, in conjunction with taconite company personnel, has made Dings the leading name in the wide field of magnetic separators for taconite concentration . . . including permanent magnet separators for both high intensity and medium intensity finisher duty—full width separators up to 72″ in width—and now, the new double drum magnetic separator, developed specifically as a finisher separator for taconite and magnetite plants handling extremely fine feed in slurry form.

Here are the "highlights" of Dings' new Double Drum Magnetic Separator which has found wide acceptance for taconite concentration . . . . .

• **No underwater spray pipes.** Water manifold provides uniform washing of concentrates *above* the water level — overcomes operators' objection to submerged sprays.

• **Tailings discharged with overflow.** This unique feature permits discharge by means of overflow, without passing through the incoming feed—maintains constant submergence of the drum, with no spigot discharges being required. Dings double drum separators consistently produce lower iron tailings.

• **More compact.** Dings unit is more compact, yet readily accessible for easier operation and extremely low maintenance.

• **Proved design and construction.** Dings magnet assembly has correct number of poles to develop uniform field throughout full length of magnet arc, with minimum iron losses. The desirable combination of full width "curtain" washing action and narrow gap pole spacing permits uniform discharge of maximum grade concentrates.

Dings manufactures a complete line of drum and belt type magnetic separators for all phases of taconite concentration, ranging from rod mill cobbing to finisher work on —325 mesh concentrate.

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Milwaukee 46, Wisconsin

Magnetic Separation Leader for over Fifty Years

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WC-254

United States

Personalities in the News

L. G. Immonen, formerly with Kennecott Copper Corporation at McGill, Nevada, was named plant manager of Western Electrochemical Company in Henderson, Nevada. Mr. Immonen, who has been active in Nevada mining and industry for the past 27 years, will supervise the operations of 450 employees at the Henderson plant.

John M. Neff, assistant manager of the Ceramics and Minerals Research department at Armour Research Foundation, Illinois Institute of Technology, has been promoted to manager. He replaces **Einar P. Flint,** who resigned to accept a position as director of inorganic research at the Mallinckrodt Chemical Works, St. Louis, Missouri.

Wayne R. Abbott, Oklahoma geophysicist and geologist, is general manager of field operations for Amuranium Corporation, new Colorado Plateau uranium company. Mr. Abbott has been active in the oil industry for many years and is credited with several multi-million dollar discoveries for Standard Oil of Indiana, Wood River Refining, and several private syndicates.

W. M. Kelley, vice president in charge of operations for Republic Steel Corporation, has been elected president of Reserve Mining Company, which is jointly owned by Republic and Armco Steel Corporation. He will continue as a consultant to Republic, but his main responsibility will be the $160,000,000 Reserve taconite project in northern Minnesota.

Three personnel promotions have been made by American Potash & Chemical Corporation. **George S. Wheaton,** formerly assistant vice president of the Eston Chemicals Division at Los Angeles, California, has been named vice president in charge of the division. **Thomas F. Edson,** assistant vice president of research and development, now holds the newly created position of vice president, special engineering projects. **Richard J. Hefler,** secretary, goes into the new position of assistant to the president.

John C. Howbert, mining engineer, is now employed by the Southwest Potash Company, Carlsbad, New Mexico. He formerly was with the Gogebic iron range offices of the Oliver Iron Mining division, United States Steel Corporation.

R. R. Williams, Jr. has been appointed manager of mines for the Colorado Fuel and Iron Corporation. Mr. Williams has been assistant manager of mines at Pueblo, Colorado for the past year and will assume his new post immediately. He has been with CF&I since 1925.

Philip W. Chase was named assistant vice president, raw materials, United States Steel Corporation. Previously he was director of exploration and development at U. S. Steel's Pittsburgh, Pennsylvania office. The company also announced that Mr. Chase's former duties have been transferred to **August J. Breitenstein,** director of planning in U. S. Steel's raw materials division.

W. P. Wolff, chief mining engineer at Oliver Iron Mining Division's Hibbing-Chisholm district, is retiring after more than 35 years with United States Steel Corporation. He has been at Hibbing since 1945, and before that time served in various mining engineering capacities for the company.

George J. Zimmerman, formerly chief of the technical liaison division, U. S. Army Corps of Engineers, is the new staff assistant for management Controls, The Carborundum Company.

B. E. Grant, director of labor relations for western operations, United States Smelting, Refining & Mining Company, has announced his resignation. Mr. Grant is establishing a mine management, engineering service and geologic consultant business in Salt Lake City, Utah. He will pay particular attention to the uranium mining industry, he said.

Jack Hayden, formerly with The Cleveland-Cliffs Iron Company, has been employed as plant metallurgist for the North Range Mining Company. He will be stationed at the Book mine in Crystal Falls, Michigan.

Recently added to the supervising staff of International Minerals & Chemical Corporation's Bonnie plant in Florida were: **Hubart M. Gray,** design engineer; **Howard Waldrop,** mechanical draftsman; **Raymond Tuttle,** process engineer; **Fred Stephens, Jr.,** area superintendent; **William H. McCammon,** area engineer; **James Roe,** area superintendent; **Raymond Leger,** area engineer; **Edward Ellis, Don Smalter, John Hyden, William Melrose,** and **Fred Chase,** area superintendents.

Richard H. Benish, mining engineer and uranium geologist, has been employed by the Surplus Uranium Company, Inc. and Wright, Clark & Senkell to evaluate their mining properties in Utah and Colorado.

H. Gordon Poole has been appointed head of the department of metallurgy at the Colorado School of Mines. He comes from Case Institute of Technology, where he served as associate professor of extractive metallurgy. Other recent appointments at the school include **Howard L. Hartman,** who was named assistant professor of mining; **Douglas W. Bainbridge,** assistant professor of metallurgy, and **Hildreth Frost, Jr.,** instructor in metallurgy.

R. E. Durland has assumed the position of assistant plant chemist for Calaveras Cement Company. He comes to his new post from the Southwest Potash Corporation in Carlsbad, New Mexico, where he was plant superintendent.

F. W. Libbey, director of the Oregon department of geology and mineral industries, retired November 1. He was succeeded by **Hollis M. Dole,** acting director.

Among those attending the recent Uranium Field Conference of the Utah Geological Society were: **W. Russell Anderson,** Kennecott Copper Corporation, Bingham Canyon, Utah; **Jack Benham,** Vernon Pick & Company, Grand Junction, Colorado; **Weston Bourret,** Utah Construction Company, San Francisco, California; **Jack E. Call,** Republic Uranium Company, Salt Lake City, Utah; **Alan Conner,** Christensen Diamond Products Company, Salt Lake City; **J. W. Deans,** Moab Uranium Company, Moab, Utah; **Peter Joralemon,** Consulting Geologist, San Francisco; **R. E. Radabaugh** and **P. A. Riddell,** both of New Jersey Zinc Company, Denver, Colorado; and **Pratt Seegmiller,** Marysvale, Utah.

L. H. LANGE, vice president of the Galigher Company, has returned to Salt Lake City, Utah, after completing an extensive metallurgical trip for his firm. In commenting on his trip, he said that the Northern Rhodesian copper mines may become an important factor in setting copper prices next year. While in Africa, Mr. Lange finished a metallurgical assignment for the Tsumeb Corporation, lead-zinc-copper producer which is now developing large-scale germanium metal production.

J. B. Beaty, formerly president, was named chairman of Granby Consolidated Mining, Smelting & Power Company, Ltd. in Vancouver, British Columbia recently. **L. T. Postle,** vice president and general manager, was appointed president, and **J. A. C. Ross,** general superintendent, was made general manager for the firm.

Robert Edbrook, project engineer for Harza Engineering Corporation, Chicago, Illinois, is in the Philippine Islands as head of an engineering team which is working on the designs for the Ambuklao hydroelectric power projects in Mountain Province.

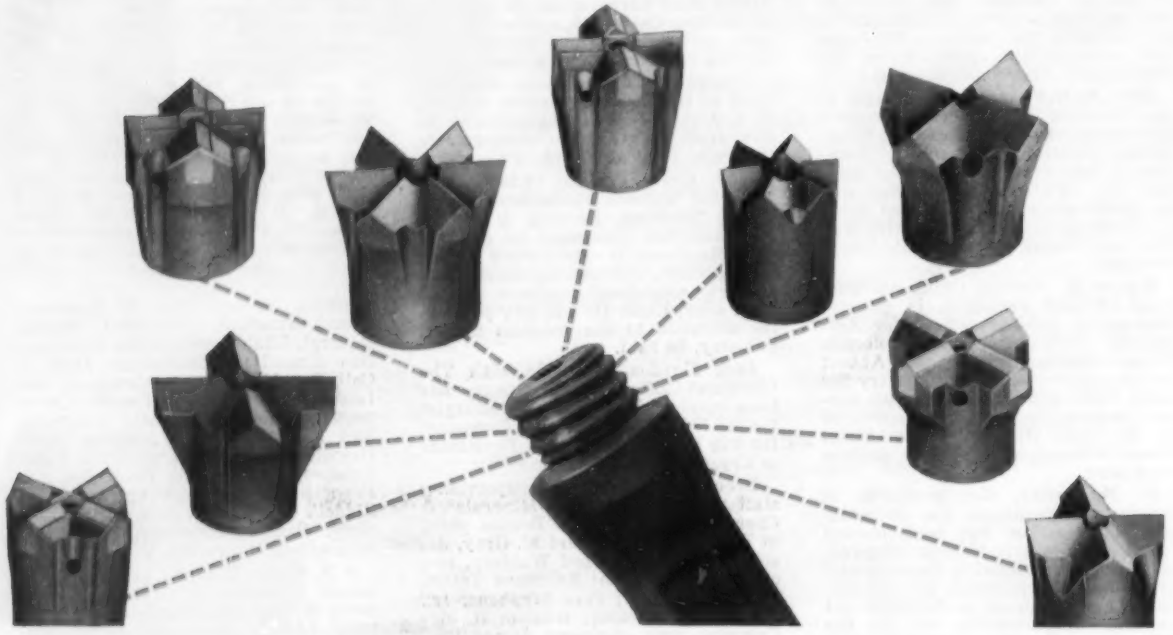
Carl Tolman, professor of geology and chairman of the geological engineering department at Washington University, St. Louis, Missouri, has been named vice chancellor and dean of faculties. As a consulting mining geologist, he has led geological surveys in British Columbia, Ontario, Labrador, the western United States and Mexico.

Heath Steele, vice president and director of the American Metal Company, Ltd., is retiring from active service at the end of 1954. To date, he has held executive positions in several subsidiary companies, including the following: president and director, Southwest Potash Corporation, Carlsbad, New Mexico; president and director, Compania Minera de Penoles, S.A. and Compania Metalurgica Penoles, S.A.; chairman and director, Tsumeb Corporation, Ltd., South West Africa.

Wayne H. Burt, mining engineer, has been appointed engineer in the New York office of Kennecott Copper Corporation. Previously, he was in the industrial engineering department of the Utah division's Bingham mine.

SAVE DRILLING TIME!

Change bit types without changing drill steel!



Dozens of different TIMKEN® carbide insert and multi-use bits fit the same drill steel!

FOR the most economical drilling, it pays to change bit types as the ground changes. And this bit switching is most economical when you use Timken® carbide insert and multi-use rock bits—you don't have to change drill steels every time you change bit types. Dozens of different Timken carbide insert and multi-use bits are interchangeable on the *same* drill steel!

Drillers can unscrew one type of Timken bit and screw another bit on the same drill—right on the job! No time wasted going after another set of drill steels. No need to stock expensive double inventories.

With Timken interchangeable rock bits, you know your drillers can always use the most economical bit for the ground being drilled—Timken multi-use bits for ordinary ground, Timken carbide insert bits for hard, abrasive ground.

Both Timken carbide insert and multi-use bits give you two important advantages: 1) they are made from electric furnace Timken alloy steel, 2) a special shoulder union keeps drilling impact from damaging threads.

Our rock bit engineers may be able to help you with your drilling problems. They're experts in cutting drilling costs. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small diameter holes, very deep holes.

... your best bet for the best bit... for every job

TIMKEN

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Newsmakers in International Mining——

C. D. CHOY, key official for the Korea Tungsten Mining Company, has returned to Korea after a lengthy tour of the United States. While in America he visited several tungsten plants and contacted users of the metal. His firm, a government-owned organization, is one of the largest producers of tungsten in Korea.

George T. Scholey, chief mining engineer and head of the exploration department of A. Soriano & Co., has returned to the Philippines from a two-month trip to the United States. While in the United States he visited a number of uranium mines and treatment plants and observed the modern techniques in prospecting, mining, and treatment of uranium ores.

David P. Cruz, senior geologist of the Philippine Geological Survey, has tendered his resignation in order to become general superintendent of a p ivate mine. The property, a chromite deposit of chemical and refractory grades is operated by Zambales Base Metals, Inc., with mine properties in Subic, San Antonio, Cabangan, Botolan, and Masinboc.

P. E. Hirst, Canadian mining engineer, is now in Vancouver, British Columbia. Formerly, he was with Pine Point Mines, Ltd., Hay River, North West Territory.

R. F. Tegengren, geologist of the Bolidens Gruvaktiebolag and the Companhia Boliden de Mocambique Lda., has been in Lisbon in connection with the company's application for an exclusive mineral concession in the Tete district of Mozambique.

The Japanese steel mission now in the Philippine Islands is composed of the following: **Kamekichi Wada,** general manager of the pig iron department, Yawata Steel Company, Tokyo; **Shinichi Yoshinari,** manager of the purchasing department's iron ore division, Yawata; **Yazuru Asada,** general manager, technical department, Fugi Steel Company, Tokyo; **Mitsuo Kagawa,** consulting mining engineer, Fugi; **Masao Nakatsuyama,** consulting mining engineer, Nippon Kokan K.K.; **Hiroshi Takano,** metallurgist, Nippon Kokan.

Paul T. Walton, Salt Lake City, Utah geologist, has returned from Ethiopia, where he conferred with Emperor Haile Selassie about the possible exploration and development of uranium mining in that country. Atlas Corporation is reportedly interested in developing mineral output in the country.

Ralph J. Holmes, World Mining Consultants, Inc., New York City, headed a recently completed mineral resources survey of the Italian trust territory of Somaliland. Other members of the consulting team were **Felix Herman,** Paris, France; **Emilio Lino,** Rome, Italy, and **Gabor Dessau,** Rome. The group recommended a program of exploration of tin, iron ore, ilmenite, and barite deposits. President of World Mining Consultants, Inc. is **Evan Bennett,** New York City.

Robert L. Akright, official of the United States Atomic Energy Commission, is now stationed in Lima, Peru.

A. H. Barrios has accepted the position of director of employee relations with the Cerro de Pasco Corporation at Lima, Peru. He formerly was with Andes Copper Mining Company, Potrerillos, Chile.

Ramchandra Deo, assistant chief inspector of mines for India, is on a six-months' tour of United States mines under the supervision of the U.S. department of labor's bureau of apprenticeship. While in the northwestern section of the country, he visited Hecla Mining Company's operations. American Smelting and Refining Company's plants, and the Day Mines properties.

F. S. Anderson, director of Consolidated Zinc Propriety, Ltd., which is developing the Rum Jungle uranium field, has returned to Australia after visiting uranium plants in the United States and Canada. Mr. Anderson says that he believes that Australia has only scratched the surface of its uranium deposits. He also commented that deep drilling in the Northern Territory and in Queensland may possibly uncover deposits equal to those at the major uranium fields—Rum Jungle and Radium Hill.

Mining men from all parts of the world were in attendance at the recent Mining Show held in San Francisco, California. Pictured above at one of the sessions are JACK POWERS, sales engineer, Vascoloy-Ramlet Corporation, Denver, Colorado; CARLOS LORET DE MOLA, president and general manager, Minas de Venturosa, Lima, Peru; HERMAN DEL AGUILA, resident manager, Minas de Venturosa; A. I. RODRIGUEZ, consulting engineer, San Francisco.

New York and Honduras Rosario Mining Company, New York City, has announced the following personnel changes: **R. W. Price,** formerly manager of El Mochito Mine in Honduras, has been named general manager of the company's Central American operations, succeeding **Frank H. Stephens,** who has retired; **David L. Moore,** formerly chief geologist of El Mochito mine, has been made chief geologist in charge of the company's new exploration division in the United States, with headquarters in Grand Junction, Colorado; **Richard M. Vosburg** has been named chief geologist and **Frank L. Greene,** assistant geologist, at El Mochito mine.

A. B. MacLAREN (right), general manager of Mufulira Copper Mines Ltd., Northern Rhodesia, leaves that post December 31 to take up the position of technical director for the Rhodesian Selection Trust. He succeeds R. N. PETERSON who retires next year. Mr. MacLaren has been general manager at Mufulira since October 1951. Prior to that time he was general manager at Roan Antelope Copper Mines Ltd. for six years. F. E. BUCH, presently manager at Mufulira, will replace Mr. MacLaren.

Kenneth Iten has taken the position of geologist of Benguet Consolidated Mining Company at Balatoc in Itogen, Mountain Province, Philippine Islands.

Cameron McLauchlan, official of the Anglo-American Corporation of South Africa, Ltd., has been visiting in the United States. He has been associated with the gold mining industry in South Africa for 23 years.

H. F. Grace has announced his intention of retiring from the position of general manager, Nchanga Consolidated Copper Mines, Northern Rhodesia. He will be succeeded by **H. E. Nelems,** at present manager of the mine.

F. Brontzen, state geologist for the government of Sweden, has been appointed by the United Nations to assist the government of Israel as a consulting geologist.

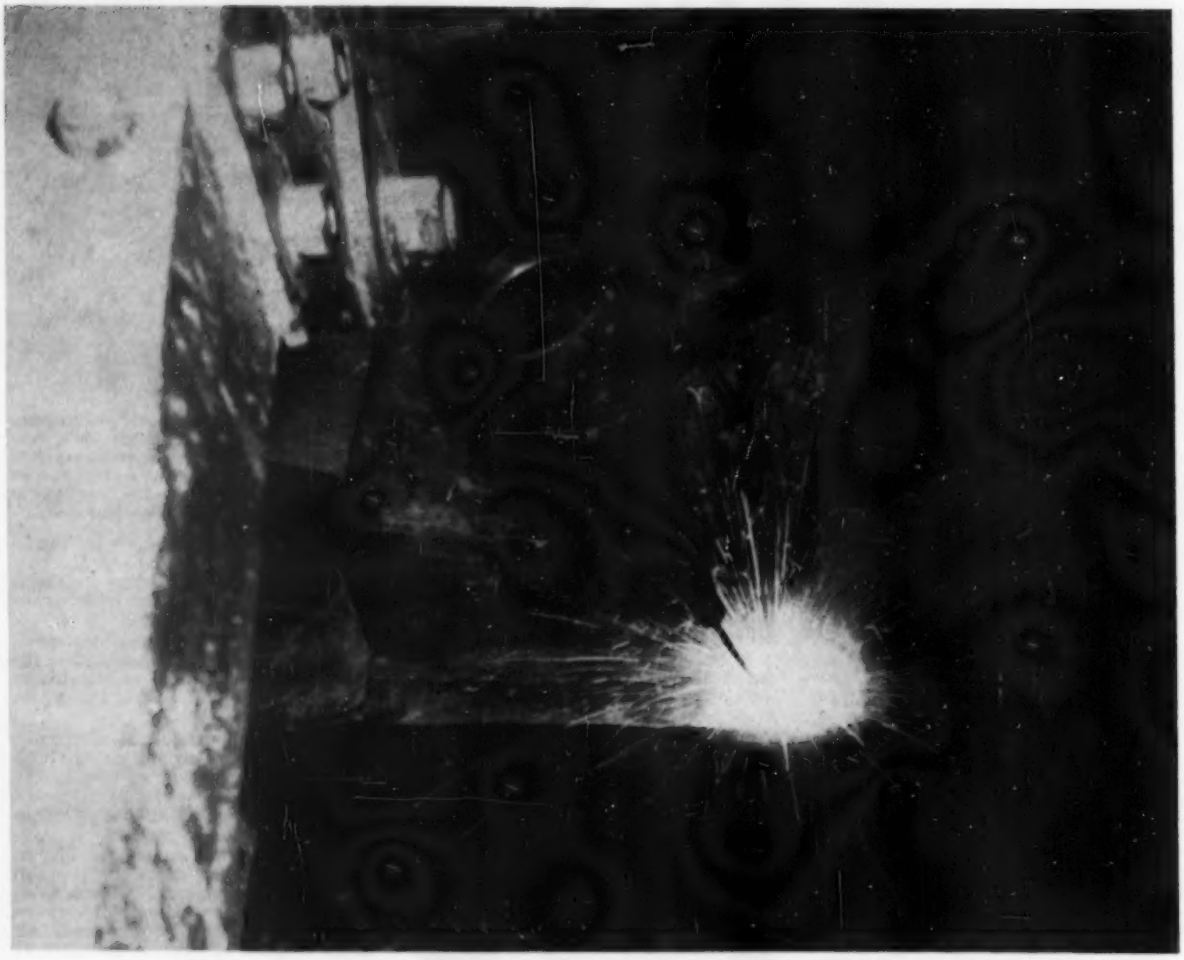
Glen W. Thrall and **Harold R. Elves,** Canadian technical experts, recently visited the Acohe Mine in Zambales, Philippine Islands. They also conferred with Philippine Bureau of Mines officials about Surigao Laterite ores and other iron mines in Mindanao.

Erik Stensio, Swedish professor of geology, has been awarded the Wollaston medal by the Geological Society of London.

Norman R. Alston, American Smelting and Refining Company metallurgist, has been named superintendent of smelters, Braden Copper Company, Caltetones, Chile. Braden is a Chilean subsidiary of Kennecott Copper Corporation.

R. S. Mathieson, formerly acting assistant chief geologist for the Bureau of Mineral Resources, is now exploration manager for Rio Tinto, Limited in Australia.

G. L. Blokhuts, Dutch mining expert, is in Mexico as a guest of the Mexican government in an attempt to help solve metal shipment problems. He is attached to the Netherland Engineers Consultants and is considered an expert on port problems.



Crusher rolls such as this can be rebuilt with Stoody Magnecote in about half the time with a 30% saving in material cost. Service life is usually twice that of a new roll.

THE STORY OF STOODY MAGNECOTE

A new build-up and hard-facing process that deposits weld metal faster, cuts labor and overhead costs

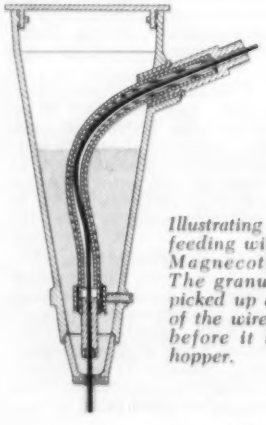
Stoody Magnecote is a new method for making high speed weld deposits. It possesses all the flexibility of manual welding with greater speed than automatic welding. Magnecote's primary applications are building up and hard-facing heavy equipment, crushers of all types, shovel parts and similar heavy sections. Because of its great speed—conservatively 3 times faster than manual welding—*far more work can be accomplished within a given time, labor and overhead costs are reduced accordingly.*

Using an annealed $\frac{3}{32}$" or $\frac{5}{64}$" .60-.70 high carbon wire as an electrode, deposit analyses can be varied, simply by changing the granular magnetic flux. At present, four Magnecote fluxes are available covering build-up and hard-facing requirements.

HOW STOODY MAGNECOTE OPERATES

The Magnecote process is applicable to all present semi-automatic welding machines. It needs only the addition of a Stoody Magnecote Hopper for feeding the flux.

Welding current passing through the bare wire (electrode) develops a magnetic field. Flux granules within the hopper are magnetically attracted to the wire, forming a uniform coating. When the arc is broken and the wire ceases to feed, small permanent magnets in the tip dam the flow of flux.



Illustrating method of feeding wire through Magnecote hopper. The granular flux is picked up at the base of the wire guide just before it leaves the hopper.

THE 4 MAGNECOTE FLUXES

MAGNECOTE 301—A build-up material producing Hadfield manganese deposits.

MAGNECOTE 304—A machinable build-up material for use on carbon or low alloy steel equipment.

MAGNECOTE 305—A hard-facing alloy having high abrasion resistance and good impact strength.

MAGNECOTE 302—A hard-facing alloy having high impact strength and good abrasion resistance.

Welding time on this Hammermill Hammer was cut in half with Stoody Magnecote. It was first built up then hardfaced for maximum life.

MAGNECOTE PROCESS OFFERS MANY OTHER ADVANTAGES

Flux dams are unnecessary—all flux is consumed. There are no flux recovery or grinding problems. Since the shielded arc process is employed, the work is visible to the operator at all times. Welding is continuous—no stub end losses. Material costs are lower than for comparable manual electrodes. Appearance of deposits gives a good indication of weld quality. Deposits are remarkably uniform, sound and free from porosity.

Multiple passes are made with ease. Amperage ranges from 200 to 350.

UNUSUAL WELDING SPEED CUTS COSTS

Considerable field work has now been completed using Stoody Magnecote on production work. The following are typical of results obtained on CRUSHER ROLLS:

Manganese Shovel Track Pads are built up with Magnecote 301. Two finish passes of Magnecote 305 insure extra wear resistance. Probable service life—50% more than replacement parts.

Case No. 1:

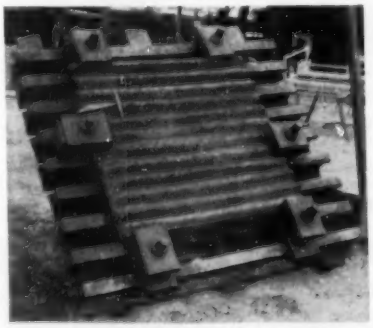
65 lbs. of Magnecote 302 were deposited in 5½ hrs. In comparison, using the two-rod filler method, 40 lbs. were deposited in 8 hrs.

Case No. 2:

On a 40" O.D. roll with a 22" face, 180 lbs. of Magnecote 301 were applied in 18 hours. The job was completed with a final pass of Coated Tube Stoodite. Total build-up: 1¼" on diameter.

On a conservative basis where a welder deposits 3 to 4 lbs. per hour by manual methods *he can now lay down from 8 to 12 lbs. per hour with Magnecote. Combined savings in labor and overhead easily amount to several dollars per hour.*

Stoody Magnecote excells on heavy equipment such as this Dredge Pump Casing where extensive buildups are required. Magnecote 301 restored size, Magnecote 302 provides an excellent final hard facing overlay.



This Crusher Jaw has manganese rounds tack welded in place to form corrugations, then entire face is rebuilt with Magnecote 301. Final passes of Magnecote 302 extend service life as much as 2 to 1 over new jaws.

Although best adapted to welding in down-hand position, the method is also applicable to inclined work by building a shelf and welding upwards.

Your Stoody dealer is now equipped to give you additional details and application help on Stoody Magnecote. Consult the yellow pages in your telephone book or write direct!

STOODY COMPANY

11969 EAST SLAUSON AVENUE • WHITTIER, CALIF.

American Potash To Build Lithium Chemical Plant

American Potash & Chemical Corporation will construct a plant for the manufacture of lithium chemical near San Antonio, Texas. The facility will be owned by a newly formed company—American Lithium Chemicals, Inc. American Potash will hold 50.1 percent of the stock, with the balance in the hands of Bikita Minerals (Private) Ltd.

Lithium ores for the plant will be supplied by Bikita from its large deposit of high-grade lithium ores in Southern Rhodesia. (See MINING WORLD, April 1954, page 55.) American Potash already holds 21.25 percent in Bikita; Selection Trust Ltd. of London holds a 50 percent interest and is responsible for technical management of Bikita; The American Metal Company Ltd. is the other shareholder.

Total capital requirement of American Lithium Chemicals and the Bikita property will be in excess of $8,000,000. A substantial portion of this will be available through a bank loan.

Initial production at San Antonio will be lithium hydroxide. American Potash has produced lithium chemicals at its Trona, California plant since 1934, with all of the Trona output since 1951 in the form of lithium carbonate. In addition, the company has been marketing lepidolite, a high-grade lithium ore, from Bikita since the latter part of 1953.

GSA To Finance Plant To Study Cuban Ores

Freeport Sulphur Company will build and operate a pilot plant at New Orleans, Louisiana, which will study a new method of obtaining nickel and cobalt from Cuban ores. The General Services Administration has agreed to provide up to $6,250,000 for the project.

The operation is designed to bring the extensive nickel and cobalt deposits at Moa Bay, Cuba into commercial production. The company will treat 50 tons per day with the ore supplied by Freeport without any charge, and the work will be done by the firm without any fee. Freeport has been studying certain phases of the process at its own expense for some time.

If the tests are successful, Freeport will build and finance its own commercial plant aimed at a capacity of 20,000,000 pounds of nickel and 3,000,000 pounds of cobalt per year. Part of the plant would be built at Moa Bay for ore concentration, and the final extraction facilities would be in the United States.

The government has agreed to buy up to 150,000,000 pounds of nickel and 15,000,000 pounds of cobalt at the prevailing market price by June 30, 1963 if the entire project reaches the stage of commercial production.

National Safety Council Launches U. S. Drive To Reduce Mine Accidents from Falls of Ground

Falls of ground, mining's No. 1 accident killer, will be attacked in an intensive new program to be launched on January 1, 1955, with the goal of slashing the annual killed and injured toll by 50 percent. The national campaign is sponsored by the Mining Section of the National Safety Council. John L. Boardman, chairman of the Anaconda Copper Mining Company bureau of safety, is chairman.

NATIONAL SAFETY COUNCIL

AWARD

TO

XYZ MINING COMPANY

GOLDEN CROSS MINE

IN RECOGNITION OF ITS OUTSTANDING ACHIEVEMENT IN PREVENTING INJURIES FROM FALLS OF GROUND

NATIONAL CAMPAIGN FOR THE PREVENTION OF FALLS OF GROUND ACCIDENTS

JANUARY 1, 1955—DECEMBER 31, 1955

All noncoal mines in the United States and Canada may participate in the campaign providing 25 or more employees work underground. Membership in the council's Mining Section is not required. Nonmember companies may obtain council materials for conducting the campaign at member prices instead of the usual charge of double the member cost.

Endorsing and cooperating in the campaign are the U. S. Bureau of Mines, the American Mining Congress, state and provincial mining departments, mining associations, mining publications, and others having an interest in safety in mines.

Requirements for participation are:

1. Companies that operate two or more mines must enroll each mine separately.
2. Each participating company agrees to provide the Mining Section with a simple report of injuries resulting from falls of rock and ore for the year, or two or three years, previous to 1955, depending on the period for which records are available.
3. Each participant agrees to send in a report of accident experience at the end of the first six months of the campaign and a final report covering the last six months.

The falls of ground campaign will cover the calendar year ending December 31, 1955. To facilitate the promotion of safety in participating mines, the Mining Section will provide a suggested plan for systematically using materials and carrying on activities. Each company may select the materials and activities most suitable for its needs and schedule them during the campaign as deemed most effective.

The National Safety Council will award a Certificate of Achievement (see cut) to all mines which carry on a minimum of four safety activities during the campaign year and accomplish either of the following results: a reduction of 50 percent in the frequency of injuries from falls of ground in comparison with the record for the previous period reported by the mine; or a record of no chargeable injury due to a fall of ground during the entire campaign year.

Members of the special campaign committee of the Mining Section in addition to Mr. Boardman are C. S. Gibson, safety director, Mines Accident Prevention Association of Ontario; A. J. Stromquist, safety director, Cleveland Cliffs Iron Company, all past general chairmen of the Mining Section; Ivan Sloane, safety director, Canadian Johns-Manville Company, Ltd., and Howard Rice, safety director, Southwest Potash Company.

Bolidens To Develop Mozambique Deposits

A preliminary geological survey of various gold, uranium ore, and copper deposits has been completed in Mozambique by the Swedish Bolidens Gruv AB. Several uranium ore claims, which had been staked prior to the government prohibition of prospecting for uranium ores, have been investigated.

In view of encouraging results obtained, the group formed in Lourenco Marques a subsidiary company, Companhia Boliden de Mocambique Lda. Boliden has simultaneously applied to the Portuguese Government for an exclusive mineral prospecting and exploration concession of a large part of the Tete District, situated between the Zambezi River and the Nyasaland boundary of the Federation of Rhodesia and Nyasaland.

The group is also applying for an exclusive mineral concession in Angola.

German Firm Acquires Rhodesian Chrome Mines

The German Otto Wolf group has acquired the Windsor Chrome Mines situated on Southern Rhodesia's Great Dyke near Que Que.

The Windsor Chrome Mines are at present a regular and important producer of high grade, hard and lumpy metallurgical chrome ore containing over 50 percent Cr_2O_3 and a high chrome-to-iron ratio exceeding 3.4 to 1.0. Most of its production is at present being exported overseas but some chrome ore is also being supplied to the Rhodesian Alloys Ltd. at Gwelo, Southern Rhodesia, for the manufacture of ferro-chrome alloys. A total of 6,591 tons of metallurgical ore was produced in the first 8 months of 1954.

The claims holding of the property comprises several hundred base metal blocks. Mining is being carried on to shallow depth in several mine sections. The chrome deposits are of the usual narrow chrome-seam type found on the Great Dyke. Eluvial chrome has also been recognized in a number of claims at the foothills of the Great Dyke Range, and it is likely that eluvial chrome concentrates will also be produced in a concentrating mill.

Large scale mine developments are being planned.

EUROPE

SPAIN—Additional quantities of mercury are expected to be offered on the world market as reports of expansion at the *Minas de Almaden* property are being circulated. The old production level of about 3,000 flasks per month continued during the early part of this year despite the installation of two new furnaces. Some operating difficulties had been encountered in the latter causing the slowup. Now that these have been overcome, production is expected to rise considerably. It is also rumored that a third furnace may be installed, which seems to indicate that mine production will be increased. A third shaft is being sunk and increased output would probably come from it. Almaden keeps its production figures a secret, but underground output is presently estimated at around 35,000 to 40,000 tons of ore annually, yielding 50,000 to 60,000 flasks of mercury after allowing for losses during treatment. Installation of a third plant might bring production to 100,000 flasks yearly.

CORNWALL—*Geevor Tin Mines* reports that for the year ended March 31 the operational profit amounted to only £53,074 compared with £115,426 last year. The drop was attributed to the fall in the price of tin, since the grade of ore milled was maintained; in fact it was 3.39 pounds per ton higher at 27.82 pounds of 70 percent cassiterite per ton. During the year 54,930 tons of ore were milled. Development was good, with ore reserves now set at 180,837 tons—much the same as last year, although the grade is slightly lower. The chairman, G. W. Simms, comments that the Cornish tin mining industry is burdened by heavy taxation. In spite of concession recently made, the taxation policy, according to Mr. Simms, still fails to adequately recognize the high risk nature of the industry.

AUSTRIA—Pure aluminum has been produced in Austria for the first time by the *Salzburg Aluminum Works* at Lend. While the average Austrian aluminum features purity of 99.85 percent, the new "raffinal" aluminum has an average degree of purity of 99.99 percent, while 99.9985 percent has already been reached. The Austrian requirements for purest aluminum will be completely covered by the Lend Works. For export, a small portion will be available.

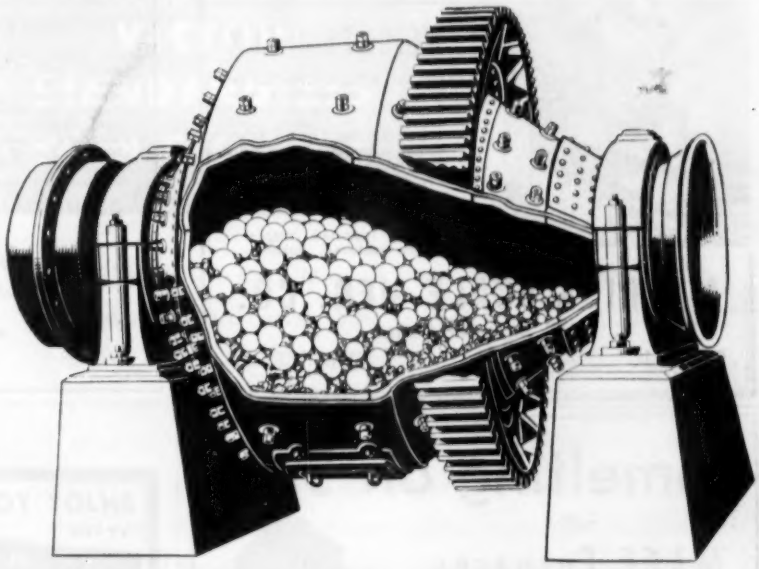
WESTERN EUROPE—Iron ore production in the countries of the European Coal and Steel Community declined somewhat during the first eight months of 1954, except in France where it was 682,000 tons of 2.4 percent higher than in the same period of 1953. Great decrease in tonnage was in West Germany which produced only 8,323,000 tons, compared with 10,142,000 tons in the first eight months of last year. Greatest percentage decrease occurred in Belgium where iron mining declined by 45.7 percent. The Community's total iron ore production dropped from 44,368,000 tons in the first eight months of 1953 to 41,704,000 tons in the same period of 1954.

HUNGARY—Bauxite is being shipped in larger volumes to Slovakia (province of the Czech Peoples' Republic) where a large aluminum mill is presently under construction. Scarcity of electric power made it impossible to manufacture the aluminum in larger volumes domestically.

ITALY—Small amounts of quicksilver, sulphur, and borax will be among the items Italy will ship to Czechoslovakia under a $2,700,000 barter agreement recently negotiated. The largest part of the transaction is for $1,000,000 worth of ball bearings. Italy will receive lumber, malt, barley, etc.

U.S.S.R.—Through the newspaper *Izvestia*, Russian ferrous metal workers are being urged to increase productivity. It was announced that rich reserves have been revealed which allow workers to pay successively the debt they owe to the state in pig iron production and to produce tens of thousands of tons of steel and rolled metal above the planned goal. The Dzershinsky Metallurgical Works, one of the larger in the Dnieper region, was criticized for lagging in its smelting output. The newspaper reported that the time of idleness of open hearth furnaces caused by repairs varies from 2 to 6 percent of the schedule time. It is suggested that the cutting of this time to the minimum would increase steel production by hundreds of thousands of tons per year.

CORNWALL—At *South Crofty Ltd.'s* operation near Caru Brea the new electric pumping installation is partially in operation so that the old Cornish pumping engines being used until now will cease working shortly.



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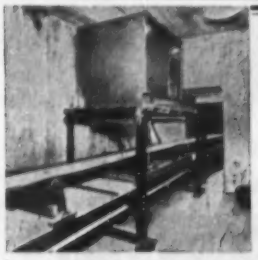

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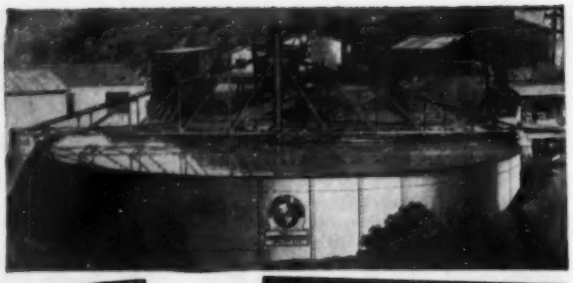

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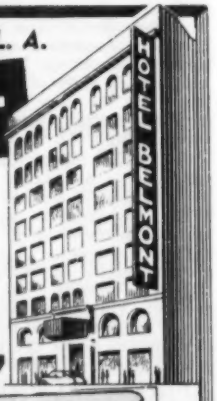

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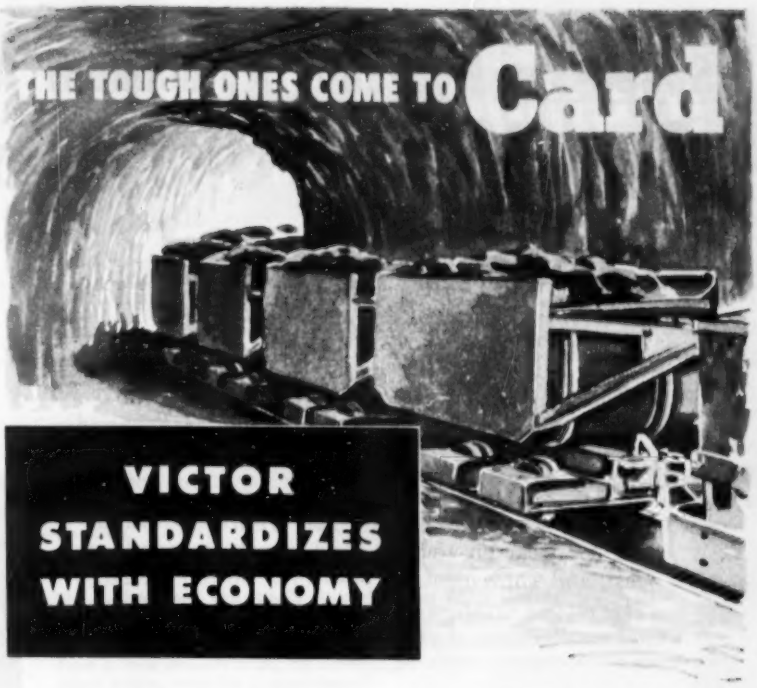
EAST GERMANY—The Fuerstenberg steel mill is to be completed by 1955. It is expected to yield two-thirds of the entire steel volume prescribed for the entire East German steel industry after 1955. Also under construction is the Calbe/Saale River plant which is the only East German plant using low-shaft furnaces, and the only East German mill using, in addition to anthracite, brown-coal-derived coke. East Germany retained about eight percent of Germany's total pre-war steel capacity after the partition in 1945, and lost four-fifths of its capacity because of dismantlings. Upon becoming a part of the Soviet economic and political block, the country began to rebuild its three dismantled steel mills and to construct the two new ones mentioned above.

AUSTRIA—The *Vereinigte Oesterreichische Eisen und Stahl Werke (United Austrian Iron and Steel Works)* has produced the 500,000th metric ton of steel by the oxygen blast refining method since the official start of production on January 5, 1953. The highest record so far was made in August 1953 when 33,000 metric tons were produced. Because of the rationalization of procedure along with experience gained so far, the time needed per charge has been decreased from the original 1 hour to 33 minutes.

SCOTLAND—The joint venture of *Rio Tinto Company, Ltd.* and *Siamese Tin Syndicate Ltd.* near Wanlockhead is making good progress. The mine has now been dewatered and sampling is being carried out.

MALAYA—*Petaling Tin Limited* officially launched its $2,000,000 No. 5 dredge in October. The dredge is one which had worked in another sector of the company's property since 1930. It took about six months for it to be dismantled, transferred, and reconstructed at its new site near Kuala Lumpur. Actually it was the 228-foot pontoon which was launched; hundreds of tons of equipment must still be assembled on it and this is expected to take until March 1955 before mining can start. With a capacity of 350,000 cubic yards per month, the unit has a maximum dredging depth of 80 feet and a total displaced tonnage of 4,300 when completed. The shortage of suitable land for prospecting, and shortage of tin reserves in existing mines, has led to the converting of rubber estates into tin mining operations.

INDIA—With German steel experts assisting in construction of a state-owned steel plant at Rourkela, Orissa, Russia is now reported to be sending a team of experts at her own expense to India to investigate building of another plant. (This would be the fifth Indian plant.) Russia is said to be willing to bear the total cost of initial financing with repayment over



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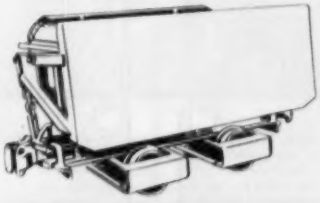

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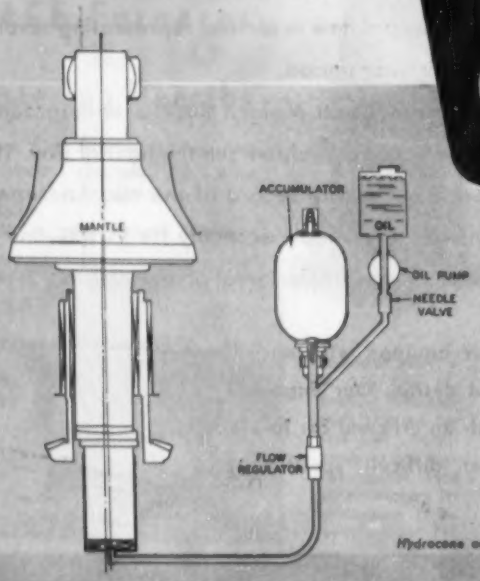

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ALLIS-CHALMERS

10 to 15 installments at 2 to 2¾ percent interest. The United Kingdom is reported to be bidding for the construction of the steel plant, too. It offers to have a plant in production within three years. Both plans are apparently under consideration.

BURMA—Because conditions are still unsettled in Lower Burma, *Tavoy Tin Dredging Corporation* has still not resumed active mining. The corporation has agreed, in principle, to a joint venture with the Government of Burma, as now required by law, but has had no further word about the joint venture. Meanwhile, the firm is financing maintenance of the mines without immediate hope of revenue.

MALAYA—*Gopeng Consolidated Ltd.*, one of the largest tin mining concerns in Perak, is spending over $1,500,000 on the deviation and extension of its 45-inch pipeline that carries water from the hills seven miles away to the mines in Kinta Valley. The huge new pipes, manufactured in Glasgow by Messrs. Mechans Ltd., range in size from 45 to 52 inches in diameter. The pipeline was first installed in 1916, and is shared with the *Kinta Tin Mines Ltd.* which is under the same general management—Osborne and Chappel. The two-mile extension is to be completed next year.

INDIA—The government has decided to license the export of chrome ore freely on presentation of shipping bills, according to the Ministry of Commerce and Industry. The export policy for chrome ore was reviewed in the light of mined stocks, progress of exports against current allotments, and the position in the international markets, before the current policy was reached.

MALAYA—For the year ended March 31, *Southern Kinta Consolidated Ltd.* produced 4,613 tons of tin concentrate compared with 4,262 tons in the previous year. Seven of the firm's nine dredges operated continuously throughout the year with only routine stoppages for repairs and renewals. Arrangements are now being made to acquire the *Sungei Bernam* area mining property in Perak, estimated to contain about 1,344 acres, from *Anglo-Oriental (Malaya) Limited.* The firm plans to transfer the *Southern Kampar No. 1* dredge to the Bernam area sometime after it has finished mining in its present region. It is expected that work in the Southern Kampar section will be finished sometime in 1955. Meanwhile, power supply is being made available.

THAILAND—There has been a sharp reduction in the profits of *Kamunting Tin Dredging* during the year ended March 31, 1954. Profits dropped to £185,000, as compared with £601,000 in the previous year. The company was unlucky in that it became necessary to move its two Pangnga dredges from the exhausted ground where they had been working to a new area. For this reason, production suffered a sizeable setback—that is, 1,374 tons of concentrate as compared with 1,979 tons during the previous year.

MALAYA—The entire output of iron ore from the *Sri Medan* mine in Johore has been contracted for sale to a Japanese firm—*Yawata Iron and Steel Company.* Operations at the mine were started in August by the *Maayan Miners Company Ltd.* who invested $1,000,000 in the project. Present rate of output is about 10,000 tons monthly and this is to be increased to between 20,000 and 30,000 tons monthly. One of the features of the

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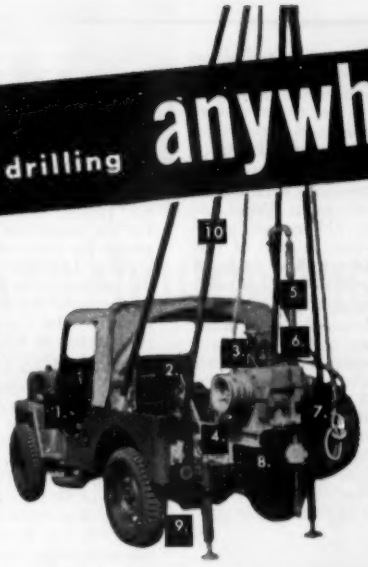

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mine is easy accessibility. Located about nine miles from Batu Pahat, it can be reached by river and ships can be loaded from a special jetty at the mine. Before the war the mine produced more than 10,000,000 tons of iron ore for Japan.

INDIA—Forty teams of Indian surveyors are due to arrive in Khatmandu shortly to conduct a survey of Nepal under the Colombo Plan. The survey is being conducted to prepare a map of this 6,000-square mile country. The scale of the map will be 1.0 inch equals 1.0 mile.

MALAYA — *Kampong Lanjut Tin Dredging Ltd.* has obtained a new mining lease over 247 acres of land at Selayang near Kuala Lumpur. Together with areas already held under mining title, the company now has 335 acres estimated to contain 38,000,000 cubic yards of dredgable tin-bearing ground, with an average value of 0.4 kati per cubic yard. The firm's dredge at Wardieburn ceased operations early in November of last year because of the presence of clay.

LATIN AMERICA

MEXICO—Discovery of what is believed to be an extensive virgin vein of gold, silver, and lead at San Andres, Tuxtla, in the state of Vera Cruz was made by accident recently. Carlos Hernandez and Cecilio Leal made the strike while breaking rock on the Catemaco collective farm to provide a firm base for their theodolite. Noticing some shiny metal, they sent it, out of curiosity, to the Sterling Laboratories in Mexico City where it was reported that the samples contained gold, silver, and lead. Since similar rocks exist throughout the region, there is speculation that the town might become a mining center.

ARGENTINA—Large deposits of titaniferous iron carrying some rare earths, were found recently in San Juan. The ore occurs as compact bodies developed in small veins of 10 to 95 centimeters width and a length of several hundred meters. The wall rocks are of Precambric age and magmatic formation. The investigation was made by the Cuyo University.

BRITISH GUIANA—The *Columbium Corporation* has decided not to grant *Illinois Zinc Company* a six-month extension on an option to purchase 900,000 shares of Columbium common stock. The firm has decided to proceed with large-scale production of columbite concentrate since it has large potential columbite reserves on property in British Guiana. There are also reported to be indications of gold in the *Taparau* area, as well as titanium and zirconium-bearing deposits in the *Kunuballi* holdings.

BOLIVIA—The *Corporacion Minera de Bolivia* reports an increase in net operating losses of $11,200,000 over 1953. The Corporacion is the operating agent for the nationalized tin, tungsten, and base metal mines in Bolivia. The loss has been attributed by an official of the firm to an increase in wages, social welfare, and indemnities paid to workers and employees. The number of workers during the year increased from 27,075 to 33,824. An average of 365.5 shifts per worker was made for the year. This shows that many of the shifts were worked on an overtime basis because of numerous holidays, etc., all of which required extra pay and raised labor costs by 68 percent. The Banco Minera has invested considerable amounts in better housing for the workers.

ARGENTINA—At an emergency meeting of mining men of San Luis (zone of La Toma), steps were taken to arrange for the importing of 10 mineral dressing plants for treatment of tungsten ore. The zone of La Toma produces 78 percent of the country's wolframite output. If these new plants would concentrate 100 tons monthly, the value of monthly recovery is reported at $300,000.

PERU—Because much of the *Cerro de Pasco Corporation's* ore body development in recent years has found that the ore is of a very refractory nature, and not readily amenable to the existing Paragsha flowsheet, a new pilot plant is being designed. The plant is to have a capacity of 60 tons per 24 hours. Ways and means of treatment are being investigated and optimum requirements will be established for the beneficiation of the highly altered lead-zinc ores. When this pilot milling operation is completed, information will then be at hand for required equipment additions and circuit changes to the flowsheet of the Paragsha concentrator so that a mixture of all Cerro lead-zinc ore may be treated with maximum overall efficiency. The firm recently reported that both its third quarter profit and the profit for the first nine months of the year rose substantially. The increase was attributed to the sale of larger tonnages of refined copper and zinc, along with a better margin for profit in 1954 than in 1953. The company said that recent increases in prices of lead and zinc did not increase the average selling price of these metals as compared with average prices in the first nine months of 1953.

BRAZIL—Manganese deposits are reported to have been located in the upper Xingu River region of the state of Amazonas. Samples tested by the Ministry of Agriculture are said to show a high manganese content. Manganese reserves in the frontier region of the states of Para, Amazonas, and Mato Grosso are estimated at 1,000,000 tons.

ARGENTINA—With financing from the Industrial Bank, the installation of a refining plant at the *Empress* mine is continuing. This mine has two gold deposits in the zone of Andacollo, Neuquen. The plant will have a capacity of 50 to 60 tons a day. Reactivation of this district was due to the increase in price of laminated fine gold.

AFRICA

GOLD COAST—It is reported that the introduction of tungsten carbide drill bits has greatly improved labor efficiency at the *Taqua & Abosso Mines Ltd.* operation. The amount of ore sent to the mill in the year ended March 31 was greater than at any time except for the 1942-1943 fiscal year. This, together with the higher grade of ore treated, helped to raise the revenue from gold sales well above the previous year. Instead of losing £22,184 as in

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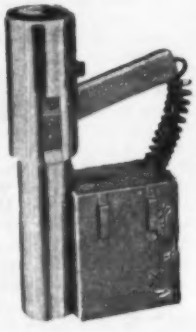

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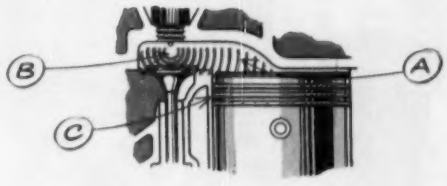

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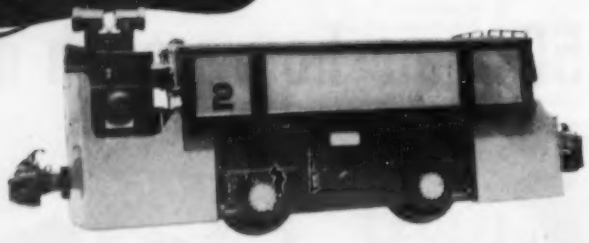

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1952-1953, the mine made a profit of £49,956 in the latest financial year. There has been a trend toward a reduction in ore reserves but the consulting engineer feels confident that substantial tonnages will be proved in the area in the next few years.

SOMALILAND—*World Mining Consultants* of New York has recently completed a comprehensive mineral resources survey for the Italian government. Besides a rapid geological reconnaissance, previous mining activities were reviewed, known prospects examined, and a program of exploration for tin, iron ore, ilmenite, and barite deposits recommended.

TANGANYIKA—*Uruwira Minerals Ltd.* treated a total of 77,816 metric tons during the last financial year ended March 31, 1954. Lead concentrates produced amounted to 6,200 dry metric tons. This falls short of the agreement with the Tanganyika government whereby the government would construct a railroad to Mpanda if the company would guarantee to produce within 18 months of the rail lines' opening 10,000 tons of concentrate annually, and to produce and convey 15,000 tons within the next 18 months. From January 1, 1954, the company was liable to convey 20,000 metric tons. However, there is a proviso that the "Governor-in-Council" may determine an arbitrary sum as being the loss for any one calendar year.

SOUTH WEST AFRICA—Prospecting by *Industrial Diamonds of South Africa (1945) Ltd.* in its tributed area at Saddle Hill North has resulted in the discovery of a diamond-bearing marine terrace, described as similar to that at Saddle Hill. Production from the Saddle Hill North terrace is to be started as soon as possible. Like the Saddle Hill terrace, the newly discovered area is in the Luderitz district. Borehole samples from the latter have yielded diamonds described as similar in quality to those from the old Saddle Hill deposit.

PORTUGUESE GUINEA—The *Canadian Aluminum Company*, through *Aluminum Union Ltd.*, is investigating the possibility of participating with the *Empresa Mineira do Ultramar* of Lisbon on the exploration of bauxite deposits which are known to exist in Portuguese Guinea. The Empresa Mineira do Ultramar has applied for an exclusive concession for bauxites in Guinea.

MOROCCO—The *Bon Skour* deposits have been reopened after two years of idleness and tests are being made on 500 tons of ore to study the possibilities of erection of a flotation plant. The deposits were discovered in 1942 and highly explored until 1951 by the *Societe Cherifienne des Recherches Minieres*. The ore body is a nearly vertical, comparatively wide deposit found in the Djebel Sarho granite. Tonnage of run-of-mine ore (assaying 2 to 3 percent copper) is estimated to exceed 1,000,000 tons. The *Bureau de Recherches et de Participations Minieres* holds an interest in the project.

BELGIAN CONGO—To prevent strategic minerals from being directly or indirectly exported to the Soviet Union or its satellites, the Belgian Colonial minister with the approval of the Belgian Colonial Council and King Baudouin I, has decreed that preliminary authorization will be required for the export of ores, metals, special alloys and by-products of beryllium, bismuth, cobalt, columbium, lithium, magnesium, molybdenum, sodium,

strontium, tungsten, tantalum, titanium, thorium, vanadium, zirconium, and rare earths. The decree also requires authorization for export of aluminum, tin, and lead, either as ores, metals or semifinished products.

UNION OF SOUTH AFRICA—The *Nickel Corporation of Africa* is reported to have acquired an option and prospecting contracts over an area in the Klerksdorp-Ventersdorp districts in which, according to the South African geological survey maps, outcrops of the Dominion Reef series occur. Drilling companies are now under contract and operations reportedly are scheduled to begin in the near future.

ANGOLA—*Empresa do Cobre de Angola* has raised the company's capital from 10,000,000 escudos to 25,000,000 escudos. The company is continuing to explore the *Mavoio* copper mine but showed a net loss of 54,000 escudos last year. Geophysical surveys and diamond drilling were carried out at Mavoio, but the results obtained to date have not confirmed the extension of the copper deposit in depth. The partially developed ore reserves are sufficient, however, for several years' operation. In the northern part of Angola (bordering Belgian Congo), the company also owns an exclusive mineral concession of about 58,000 square kilometers in area. It has been operating a small copper smelter there since 1949. Recently promising montramite (vanadium ore) deposits have been discovered in the concession area.

PHILIPPINE ISLANDS—The Central Bank and the Department of Finance have approved the release of Pesos 478,479.10 as the initial amount to implement the gold subsidy law providing for government assistance to the hard-pressed gold mining industry. In accordance with the new law, gold miners are given the choice of selling their newly mined gold at the local free market at whatever price they can get, or to the Central Bank at the subsidy price of Pesos 111.72 and Pesos 105.40 per ounce refined, depending upon their classification as either marginal or non-marginal.

FIJI ISLAND—*Emperor Mines Ltd.* has encountered 1.0 ounce gold values in the eastern section of the mine. Between 1,560 and 1,705 feet, three sections totaling 40 feet gave 20 dwt. assays. Similar values were encountered in a second hole from 1,635 to 1,645 feet and 1,775 to 1,785 feet. The holes are between 3,000 and 3,500 feet southeast of the Wallace Smith shaft and the discoveries suggest downward continuation of gold values found in the 2,195 north crosscut east at No. 9 level. In the 12 weeks ended September 15, 30,601 tons of ore were milled for 11,780 ounces of gold. The mill also treated 8,142 tons of Loloma and 2,983 tons for Dolphin mines during the period.

NORTHERN TERRITORY — *North Australian Uranium Corporation N.L.* has reduced its Sleisbeck area following ground prospecting and airborne scintillometer work. The amended area covers 360 square miles. A number of diamond drill holes have been put down at "No. 4 exposure" where the original discovery was made. Assays showing 0.52 to 0.83 pounds of U_3O_8 per ton have been determined in ore widths of from 8 feet to 35 feet, true width, depth being about 90 feet. The company states that ore of this grade would not be rich enough to bear transportation costs to the Rum Jungle mill. If there proves to be sufficient ore, a local plant for its treatment will be erected. The company has also found that there are many parts of the Sleisbeck area where ground and aerial surveys indicate high radioactivity. Areas have been applied for by the firm in the South Alligator River district but objections have been filed by another company.

NEW SOUTH WALES—*Broken Hill South Ltd.* increased output by 20 percent in the year ended June 30. Tonnage was 356,113. Present extraction is at the rate of 400,000 tons. Ore reserves fell from 1,987,000 tons to 1,926,000 tons. Despite higher production profit declined from £A 1,462,011 to £A 1,278,362 because of lower metal prices. At *North Broken Hill Ltd.* for the year ended June 30, 379,001 tons of ore were mined for 69,494 tons of lead concentrate and 70,509 tons of zinc concentrate. Net profit was increased by £A 168,029 to £A 1,768,087. Ore treated was an increase of nearly 30,000 tons compared with the previous year.

WESTERN AUSTRALIA—*Kalgoorlie Southern Gold Mines N.L.* which is testing for a southward repetition of the *Golden Mile* has increased its capital in order to undertake further work. Generally, drilling and surface examination to date have shown mineralization and rock alteration continuing southwestward broadly parallel to the major system known as the Boulder fault. Recent drilling costs in hole S.E. 6 to 4,700 feet have averaged 52/ per foot.

PHILIPPINE ISLANDS—A new base metal mining company with chromite and/or copper properties at Subic, Cabanga, Masinloc, Botolan, Santa Cruz, and San Antonio, province of Zambales, is expected to go into production before the end of this year.

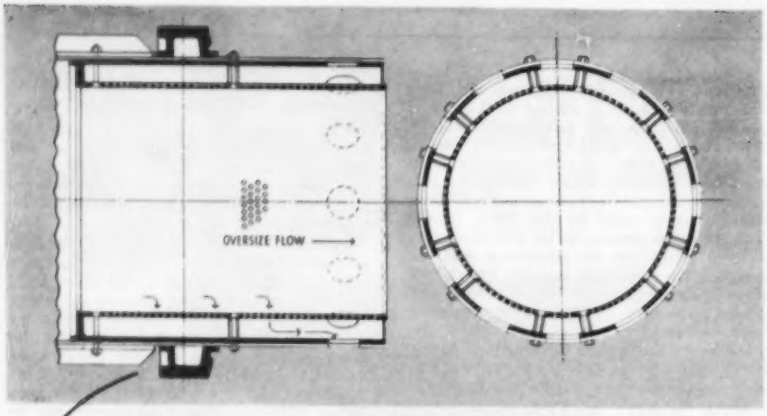
QUEENSLAND—*Australasian Oil Exploration Ltd.* reports that, in conjunction with *Petroleum Drilling Corporation Ltd.*, the firm plans to organize a company which will erect a uranium treatment plant near Mt. Isa. Australasian owns the *Mary Kathleen* and *Counter* leases near Mt. Isa. *Mt. Isa Mines Ltd.* is also reported to have made an offer to the Australian Atomic Energy Commission to construct and operate a treatment plant, provided that sufficient uranium ore is found in the district. It is not known at this stage whether one or both plants will be built.

INDONESIA—Export figures for manganese ore (metallurgical grade) in May and June were as follows: May 1,948 metric tons; June 3,500 metric tons. There was no home consumption and most of the shipments went to Europe. In May 2,800 tons of tin concentrate and slag were exported and in May 120 tons of tin metal; in June 3,662 tons of tin concentrate and slag were exported, and 73 tons of tin metal. Home consumption is at the rate of about 15 to 20 tons of tin metal per month.

QUEENSLAND—*Mount Morgan Ltd.* produced 5,474 tons of blister copper in the year ended June 30; also 61,945 ounces gold and 18,195 ounces silver. Copper production was lower than for the previous year by 834 tons because of a protracted smelter shutdown. It is expected that 1954-1955 output will be

Atlas Expanding Copper Mill to 10,000 Tons

This is the latest view of the 4,000-ton copper flotation mill of Atlas Consolidated Mining and Development Corporation on Cebu Island in the Philippines. The picture was taken from the upper bench of the Toledo open-pit mine which will provide the ore. The crushing plant is at the right foreground. A conveyor belt will be installed to carry crushed ore to the grinding and flotation plant at upper left. The operation is expected to go into production shortly, and already plans are being drawn to increase capacity to 10,000-tons per day. Geophysical work to date has been extremely satisfactory and with an intensified drilling campaign the firm now reports ore reserves at 35,000,000 tons with an average grade of 1.08 percent copper. Also the depth and end limits of the main ore body have not yet been determined. Atlas is a consolidation of three former gold producers—Masbate Consolidated Mining and Development Corporation, IXL Mining Company, and Antamok Goldfields Mining Company. For complete report on Atlas see MINING WORLD, pages 62 through 65, September 1954.



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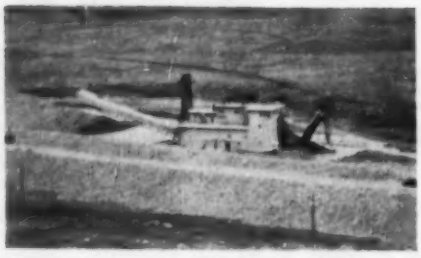

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about 7,000 tons. Total ore and overburden handled in the last financial year totaled 3,795,591 tons, of which 2,878,046 tons was overburden. Ore treated averaged 3.02 dwts. gold and 0.96 percent Cu per ton.

PHILIPPINE ISLANDS—A shipment of 14,823 metric tons of iron ore left Larap, Camarine Norte in September, achieving a new loading record according to the Base Metals Association of the Philippines. The ore was loaded by the *Philippine Iron Mines* in three days, 16 hours, and 20 minutes, and was made directly from the company's pier at Larap. The ore ship, *Nichinyu Maru*, was on its maiden voyage to Japan.

VICTORIA—Following a recent decision to cease operations of the dredge of *Harrietville (Tronoh) Ltd.* at Harrietville, *Cocks Eldorado Gold Dredging N.L.*, at Eldorado, has also decided to suspend operations. This dredge has been treating about 155,000 cubic yards monthly for a mixed gold-tin concentrate but operations have become unprofitable. *Central Victoria Dredging Company N.L.* on its *Amphitheater* property is also obtaining low yields—about 120 ounces of gold per month from 100,000 cubic yards treated.

PHILIPPINE ISLANDS—The government has created a board for the purpose of implementing the new law which grants subsidy to the country's hard-pressed gold mining industry. Chairman is Secretary of Agriculture Salvador Araneta. Other members are Central Bank Governor Miguel Cuaderno, Secretary of Finance Jaime Hernandez, Secretary of Labor Eleuterio Adevoso, and Servillano Aquino. Among the duties of the board are to determine the classification of gold producers—whether they are marginal or sub-marginal mines; to determine how gold bullion would be sold to the Central Bank—as refined or as bullion; and to prepare the organization of personnel that will assist the board and the special technical committee also to be set up.

MANITOBA—A syndicate has been formed to develop the *Nickel Belle* claims on Kisseynew Lake 20 miles north of Flin Flon. Exploratory drilling is now under way on the claims which adjoin the property of *Manchica Mining Company*.

BRITISH COLUMBIA — *Craigmont Mines, Ltd.* has been incorporated to acquire and develop an eight-claim copper prospect in the Nicola mining division, 14 miles northwest of Merritt. Promising values have been uncovered by surface trenching over a length of 225 feet, and width of 45 feet. Plans include construction of a two-mile road, bulldozer stripping, and diamond drilling. G. Allan MacPherson and Neil McDiarmid of Vancouver are among those associated with the development. Dr. C. Riley is consulting geologist.

ALASKA—The last load of tin concentrate for the 1954 season was shipped by *U. S. Tin Corporation* from its mine at Lost River in October. The shipment consisted of 125 tons of about 70 percent metallic tin content with approximately

0.5 percent tungsten as a byproduct. Destination is the government's tin smelter at Texas City, Texas.

NEW BRUNSWICK—*Technical Mine Consultants* is continuing diamond drilling on its 180-claim property 20 miles south of Fredericton. Hole No. 3, the latest completed at this writing, returned the best results. This hole was drilled to 528 feet and cut three sections from 1.5 to 3.0 feet wide. Uranium assays ranged from 0.03 percent U_3O_8 up to 0.14 percent U_3O_8 per ton. Surface prospecting is being carried out simultaneously, and has located several additional radioactive outcrops which will merit surface trenching and possible diamond drilling. The lateness of the season precludes much additional surface work this year but an active surface program is planned for 1955.

BRITISH COLUMBIA — *Granduc Mines*, with the 1954 season not yet completed, had developed its two copper ore bodies for a total length of 3,300 feet, compared with 900 feet at the end of the 1953 season. The property is located just inside the Alaskan panhandle in Leduc River Valley, 25 miles northwest of Stewart. *Granby Consolidated* and *Newmont Mining Corporation* are financing the property jointly. At the *Red Rose* mine of *Western Tungsten Copper Mines Ltd.* at Hazelton, shaft sinking has been completed to the 1,100 level. Drifting was to be resumed on the 900 and 1000 levels, where good ore previously was opened. The mill has been operating at about 125 tons daily, with tungsten concentrates meeting specifications of the purchaser for copper and phosphorus.

SASKATCHEWAN — *Violamac Mines Ltd.* has acquired the property of *Cinch Lake Uranium Mines Ltd.* two miles west of Eldorado in the Beaverlodge Lake area. A new company called *Lake Cinch Mines Ltd.* will be formed.

ALASKA—Prospectors have been stampeding the Happy River area 110 miles north of Anchorage where uranium has been reported. One of the original discoverers of eight uranium claims is George Kitchen. A tent town has been erected and named Uranium City by hopeful prospectors. The winter freeze-up will isolate the area completely, and old-timers are concerned about the eager prospectors who may be caught without supplies and adequate housing.

ONTARIO—*Quebec Nickel Corporation Ltd.* reports results from the first sampling underground at its *Werner Lake* property in the Red Lake mining district 64 miles north of Kenora. When first penetrated, the west wall averaged 1.56 percent nickel and 0.74 percent copper across a width of 24.1 feet. Slashing this wall, reportedly exposed another face 19.5 feet wide which averaged 2.62 percent nickel and 0.65 percent copper. Work is continuing on this 250-foot crosscut. The shaft itself was sunk to a depth of 360 feet, with a level established at the 300-foot horizon. Loading pockets have been prepared below this level. Activity on the property so far has been concentrated on underground work and the construction of necessary surface buildings for the mining plant and housing.

BRITISH COLUMBIA—*Western Nickel Ltd.* spend $1,100,000 on development work at the *Pacific Nickel* mine near Choate before deciding to suspend operations. Since the start of the project in February 1953, the firm had completed 9,231 feet or drifting and crosscutting;

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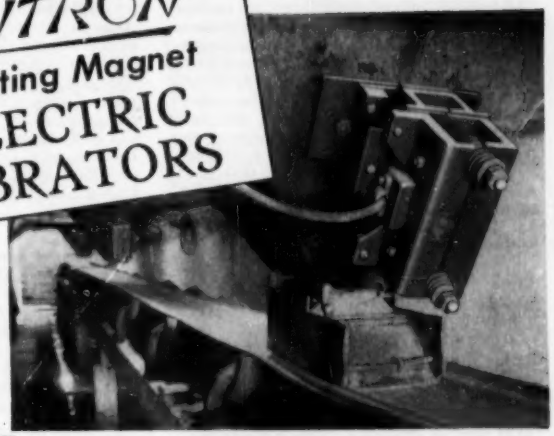

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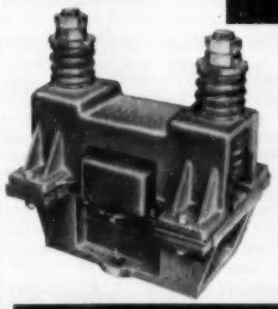

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447 feet of raising; 43,575 feet of underground drilling; and 3,237 feet of surface drilling. Despite the close drilling only two ore bodies were located on the 2,950-foot sub-level and only one on the 2,600 level. The largest ore body in the upper workings, the Pride of Emory, did not reach the sub-level. The reserve was recalculated and estimated at 1,191,000 tons of available ore, only 189,000 tons more than the estimate of 1952, and did not justify additional financing. The project had been undertaken by *Pacific Nickel Mines Ltd.* and *Newmont Mining Corporation*. Further assistance had been supplied by the General Service Administration of the United States in the form of a government loan.

NORTHWEST TERRITORIES—*North Rankin Nickel Mines Ltd.*, formerly *Rankin Inlet Nickel Mines, Ltd.*, reports that it has completed 2,300 feet of crosscutting and drifting underground since May. Also 5,000 feet of diamond drilling from underground and 5,600 feet of surface drilling has been done. A great deal of the underground drilling was to block out the ore previously indicated by surface diamond drilling. Estimated ore reserves to the 300-foot level in the shaft area are 460,000 tons of average grade 3.30 percent nickel and 0.81 percent copper per ton. Underground operations will be suspended until May to keep step with the mill construction.

ONTARIO—A new enterprise named *Stanleigh Mining Corporation Ltd.*, with headquarters in Toronto, has acquired over the past year a block of uranium claims in the Blind River Region, parallel to and adjoining the major showings of Algoma. Howard Steven Strouth, chief of the mining division of *Standard Ore & Alloys Corporation* of New York, heads the new firm. A drilling program has started with a contract awarded to *E. J. Longyear Company*. Others associated in the new group are J. M. Cunningham-Dunlop, vice president of *Ventures Ltd.*, and Paul Bock, vice president of *Lehigh Valley Coal Corporation*.

BRITISH COLUMBIA—The *Consolidated Mining and Smelting Company of Canada* will develop the *Kootenay Florence* mine of *Western Mines Ltd.* near Ainsworth. *Cominco* is conducting a geological survey of the property which extends 4½ miles from *Yale Lead and Zinc Mines*, through the optioned *Woodbury* mine which adjoins Cominco's *Bluebell* mine on the west. Diamond drilling will follow to determine whether underground development is warranted.

ONTARIO—*International Nickel Company, Inc.* is now using roof bolts to form self-supporting arches in its *Garson* underground mine in the Sudbury district. The technique eliminates potential accident hazards, and under certain conditions permits elimination of timber as a support. This, in turn, provides more space for mechanical operations, increased working space for miners, affords greater underground visibility, and improved ventilation. There is also a substantial reduction in fire hazard.

ONTARIO—The Algoma uranium field is the scene of much promising activity. *Algom Uranium Mines Ltd.* has already developed well over 4,000,000 tons of ore in the Nordic Lake section of its property, to a dip depth of 1,200 feet. A deep exploratory hole on Algom property near the boundary with the newly incorporated *Lake Nordic Uranium Mines Ltd.* has cut typical ore grade material at a vertical depth of 2,000 feet and 6,000-down-dip from the already important Nordic orebody. *Buckles Algoma Uranium Mines Ltd*, also newly formed, has started drilling on the extension of the Algom Company's Nordic ore body, and has been successful in the first holes finished. The *McIntyre*-optioned *Aquarius* property has had encouraging diamond drill results. Work has been temporarily halted to allow the staff to study metallurgical problems and production costs. The *New Jersey Zinc Company's* optioned properties of *Calder Bousquet*, *Big Game Mines*, *Gui-Por Uranium Mines*, and *Moon Lake Uranium Mines* have all been geologically mapped now and diamond drilling is under way.

ALASKA—The U. S. Department of the Interior has released a preliminary geologic reconnaissance map of a portion of the Lower Kuskokwim area which may provide helpful information for exploration of gold, platinum, and other mineral deposits. Compiled by J. M. Hoare and W. L. Coonrad from field data collected in the period from 1946 to 1950, the map covers approximately 10,000 square miles which were mapped in reconnaissance fashion. This preliminary map provides advance information; a complete report of the results of the survey is in preparation.

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MULTICLONE BOOKLET: The Western Precipitation Corporation of Los Angeles, California has published a helpful and informative booklet outlining theories and basic principles of centrifugal dust recovery. Also included are discussions on how the multiclone is adapted to meet varying inlet-outlet requirements, space considerations and maintenance. For your copy circle No. 1.

SURVEY EQUIPMENT: For your survey requirements consult a R. L. Esson and Co. Ltd. catalog advises this Johannesburg firm. These specialists in survey instruments and equipment also offer the "Orange Series" of field and calculation books. Circle No. 2.

MODERN MINING METHODS a new booklet (MS-977) gives a pictorial review of the Allis-Chalmers line of industrial equipment as applied to the mining industry. The complete story of equipment development for mechanized operations is outlined for both surface and underground installations. No. 3 reserves a copy for you.

GASOLINE POWERED DRILL: Rock drills are more portable than ever. Stanco Manufacturing and Sales, Inc., 9820 San Fernando Road, Pacoima, California now offers mine operators the Pionjar, a lightweight, gasoline powered rock drill. The 86 pound machine is equipped with a built-in blower for hole cleaning. It is reported that both angle and horizontal drilling is possible because of the "floatless" carburetor in the 2-cycle engine. Circle No. 4 for more information.

TURBINE PUMPS FOR INDUSTRY: This is the title of a new 8-page bulletin (No. 735-1) describing the latest models of vertical turbine pumps manufactured by the Pacific Coast Works of the A. O. Smith Corporation. The bulletin shows characteristic curves and gives a detailed description of principal components. Circle No. 5 for your copy.

PAYLOADER APPLICATIONS: The Frank G. Hough Co. has issued an interesting publication that shows some of the units in operation at pits, plants, smelters and refineries. Form No. 272 describing the Payloader tractor-shovel may be obtained by writing to the Frank G. Hough Co., 859 Seventh Street, Libertyville, Ill., or circling No. 6.

MERCURY VAPOR METER: Interest in mercury continues to mount and the Harold Kruger Instruments Co. of San Gabriel, California describes their vapor meter for quickly detecting cinnabar in ores. Their literature states that the most important features of these meters are the light weight and internal standards for all ranges. For more information circle No. 7.

RECORDING COUNTER: The Sherwin Instrument Company, Inc., New York City, announces the production of an extremely sensitive recording scintillation counter. They report that the counter was designed primarily for airborne or ground geological surveys in searching for uranium. The units are shockmounted and the company also offers a service for installating this equipment in any type of plane or vehicle. For literature circle No. 8.

FACTS ON BULLDOZERS: A new two-color catalog featuring cable-controlled bulldozer and bullgrader blades for International TD-18A and TD-14A crawler tractors has been produced by the International Harvester Export Co. Specifications of International front and track mounted blades are included. Copies are available by writing the company at 180 N. Michigan Ave., Chicago 1, Ill. and requesting catalog E-144-D or circling No. 9.

ARC WELDING NEWS: Hobart Arc Welding News, a 24-page booklet of interesting photographs and articles on welding from all over North America, is now available. A glance at the table of contents reveals articles on control problems, cost cutting practices and how welding attachments speed underground installations to name a few. For your copy write the Hobart Brothers Company, Troy, Ohio or circle No. 10.

FOR METALLURGISTS bulletin D. D. S. 10.15-11 describes the application and operation of the A. O. Beckman Model F-3 Oxygen Analyzer and Brown ElectroniK Recorder for measurement of oxygen in industrial processes. This data sheet published by the Minneapolis-Honeywell Regulator Co. may help solve a combustion problem on reheat furnaces, reverberatory furnaces, or for quality control of inert atmosphere furnaces for annealing. Circle No. 11.

TESTING PROCESS METHODS: The practical necessity for laboratory testing and Western Machinery Company's test service is described in bulletin No. L-1-C-1. Also covered are an analysis of typical process problems and their solutions by Wemco's laboratory service. Copies are available by contacting the company at 760 Folsom St., San Francisco or circling No. 12.

REAGENT FEEDER: Here is an item for the mill man to investigate, the Fisher & Porter Feedrator for reagent feeding. Rate settings can be made with a needle valve in the Feedrator body, and flow rate can be read on a graduated metering tube. A small flow of water (approximately 1 to 2½ GPM) introduced at the top of the Feedrator operates the unit. For more information circle No. 15.

CYCLONE APPLICATIONS: Cyclones and cyclone applications are discussed in a new 18 page booklet recently released by Heyl & Patterson. Discussions are simplified but excellent. Flowsheets are shown. For your copy circle No. 20.

ENGINE-GENERATOR SETS: Le Roi Division of Westinghouse Air Brake Company's new bulletin describes and illustrates seven engine models from 60 to 675 horsepower with generators capable of producing from 50 to 350 KW. Copies are available by writing the company at 1706 S. 68th St., Milwaukee 14, Wis. or circling No. 22.

DECO WALL CALENDAR: The 1955 wall calendar, published by the Denver Equipment Company, is just off the press. Space is provided below each date to record daily mill production or other pertinent data. For your copy circle No. 23.

STOP CONTROL FOR VIBRATORS: A new automatic stop control designed to replace mechanical snubbing on vibrating equipment with smooth electrical braking action has been announced by Allis-Chalmers Manufacturing Co. The new device supplies electrical energy to plug-stop the motor safely without imposing high torque on either the motor or drive. A description is available in leaflet 07B8141 available from the company at 985 S. 70th St., Milwaukee, Wis. or by circling No. 24.

NEW COUNTER: The Uranium Engineering Co. of Grand Junction, Colo. announces the new 610 Babbel Counter, which they describe as offering longer battery-life and more trouble free operation. This model also contains a built-in recorder jack and is offered with either conventional or the new bismuth counter tube. For more information circle No. 25.

HOT METAL CARS: The M. H. Treadwill Company, 140 Cedar Street, New York City has published a new catalog describing their mixer-type hot metal cars. Heat retention characteristics and linings as well as a variety of other features are discussed. To obtain your copy circle No. 26.

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LOADING AND STOCKPILING with the new Stephens-Adamson Swiveloader is described in bulletin 834 just released by the company. A centrifugal thrower unit designed to work at the end of a conveyor or loading spout throws the material for distances of 35-feet or more. To obtain your copy write to the company or circle No. 16.

EQUIPMENT CATALOG: A new edition of Bucyrus-Erie's general catalog (GC-5A), describing the company's complete line of excavating, drilling and material handling equipment, has been released. The catalog features concise copy and specifications. Copies can be obtained by writing to Bucyrus-Erie at South Milwaukee, Wis. or circling No. 17.

REAGENT CONTROL is highlighted in the Denver Equipment Company's bulletin No. F9-B8. Reagent feeders for wet, dry and corrosive materials are described along with typical operating data and capacities. The wet Reagent feeder can be equipped with a heating element to handle liquids which change viscosity with different temperatures. Circle No. 18 for your copy.

RADIOACTIVITY EQUIPMENT: A complete line of basic radioactive instrumentation equipment for the laboratory or field is described in Nucleonic Company of America's catalog No. 53-1. This 12-page catalog gives very detailed information about scalers, counters, detectors, and rate meter instruments. If you want to know more about radioactivity equipment, circle No. 39.

FOR URANIUM PROSPECTORS: Precision Radiation Instruments, Inc. has published a handy pocket-size booklet containing 64 questions and answers on Geiger counters and scintillators. For your copy circle No. 28.

CENTRIFUGAL PUMPS: A new bulletin on self-priming centrifugal pumps issued by Worthington Corporation explains graphically the specifications, applications and sizes of various types. Also included is information on component parts and characteristics of various parts. For a copy of bulletin No. W-395-B2 circle No. 29.

DEEP HOLE PERCUSSION DRILLING data and application has been assembled in catalog form by the Gardner-Denver Company. Mine operators should find this booklet containing actual job reports and application suggestions very informative. Thirteen drawings outline vertical and horizontal ring drilling, pillar recovery, block caving, exploration and sampling applications. To obtain a copy circle No. 30.

PRODUCTION ROAD, a 16-page magazine just released by the Twin Disc Co., of Racine, Wis., contains a series of articles of interest to every engineer. Feature story is "Construction 1954. . . . A $36,000,000,000 Boom." Other articles include "New Life for Retired Crawlers, Cushioning Shocks through Fluid Drive, and Tracking Down a Half-Century of Cats." You may obtain a copy by writing to the company at the above address or circling No. 31.

FACTS ON KILNS AND DRYERS: Full descriptive literature on Standard Steel Corporation's kilns, calciners, coolers and dryers and their many applications can now be obtained by contacting the company at 5031 Boyle Avenue, Los Angeles 58. To back up its products, Standard has established its own engineering and design departments; their laboratory and pilot plant help solve problems before the blue print stage. For information circle No. 32.

SCINTILLATION COUNTERS: The R-C Scientific Instrument Co. originally developed instruments for the detection of radioactive materials in laboratory use; they now offer two new scintillation counting survey meters. For information on these counters circle No. 33.

OVERCOME WELDING PROBLEMS: "How to Overcome Your Welding Problems and Improve Your Welding Techniques" is the title of a new 8-page, illustrated booklet just released by Eutectic Welding Alloys Corp., Flushing, N. Y. Written for weldors by weldors it is a practical down-to-earth manual. Circle No. 34 for your copy.

RECOVER SUSPENDED MATERIALS: An 8-page catalog published by Bulkley, Dunton Processes, Inc. of New York outlines the Colloidair System for recovery of suspended materials from process liquors. Installations are designed to capture raw materials for return to process and replace or improve existing methods of solids separation according to the pamphlet. Circle No. 35.

CONVEYOR BELT CHART: A new color chart showing engineering data for standard conveyor belt constructions is now ready for distribution by Quaker Rubber Corporation, Division of H. K. Porter Co., Inc. It shows graphically 6 strength characteristics for 8 of the most popular ply and material combinations of conveyor belt constructions. Circle No. 36.

FOR TEMPERATURE CONTROL: A new instrument which is said to accurately measure process temperatures and pneumatically transmit the information to a central recording or controlling station has been announced by the Foxboro Company of Foxboro, Mass. It is described as having a calibrated accuracy of ½% of the temperature span. For information circle No. 37.

STAINLESS STEEL PIPING: Data of interest and value to engineers and designers associated with problems involving stainless piping are included in a bulletin recently published by the Tubular Products Division of the Babcock & Wilcox Company. Methods for bending and joining stainless pipe are discussed and also the problem of lightwall versus heavy wall pipe. For literature circle No. 38.

NEW WOUND-ROTOR MOTOR: What is believed to be the first rib-type enclosed, fan-cooled wound-rotor motor to be made with slip rings, brushing rigging, rotor and stator inside a single frame enclosure has been announced by Allis Chalmers Manufacturing Company. The new unit is available at 1800 rpm and slower speeds in standard enclosed or explosion-proof construction. More information is available on request from Allis-Chalmers Manufacturing Company, 985 S. 70th Street, Milwaukee, Wisconsin, or circling No. 19.

NEW TRANSMISSION BELT: Poly-V drive, Raybestos-Manhattan's new concept of belt power transmission is described in a brochure No. 6638 just issude. Design characteristics of the single, endless belt with molded lengthwise ribs, are explained in drawings that show why 14 specific advantages are claimed for the drive. For further details circle No. 21.

COOLING SYSTEMS: The importance of the cooling system in the internal combustion engine is highlighted in a new bulletin entitled "Give the Cooling System a Chance." This bulletin contains many practical suggestions on the best way to care for an engine's cooling system. Copies may be obtained by addressing requests to the Cummins Engine Company, Columbus, Indiana or circling No. 27.

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Fermin Malaga Santolalla e Hijos .....Oct. 70
Fomento de Minerales .....Sep. 89
Freddies Consolidated Mines .....Nov. 77
Freddies North Lease Area, Ltd. .....Jun. 85
Freddies South Lease Area, Ltd. .....Jun. 85
Freeburgh Dredging N. L. .....Feb. 78
Frobisher, Ltd. ..Feb. 53; Mar. 67; Aug. 62; Oct. 67
Frontino Gold Mines Ltd. .....Oct. 72
Fuji .....Nov. 76
Furukawa Electric Industry Co. .....Sep. 94

Gambia Minerals Ltd. .....Oct. 76
Gaspe Copper Mines Ltd. .....Aug. 60
Geco Mines Ltd. .....Sep. 99
Geevor Mines .....Feb. 71; Jun. 79; Dec. 57
General Base Metals, Inc. ....Feb. 75; Mar. 77
General Exploration Orange Free State Co. ..Sep. 91
General Mining & Finance Corp., Ltd. ..Feb. 53; Nov. 78
General Refractories, Ltd. .....Jul. 80
Gesellschaft Zur Verwertung Pflanzlicher Rohstoffe .....Oct. 78
Giant Yellowknife Gold Mines Ltd. ..Mar. 71; Nov. 68
God's Lake Gold Mines, Ltd. .....Jul. 83
Gold & Base Metal Mines .....May 69
Gold & Base Metal Mines of Nigeria, Ltd. ..Oct. 77
Gold Coast Main Reef .....Nov. 77
Goldfields Uranium Mines, Ltd. .....Sep. 99
Goldmaque Mines, Ltd. .....May 66
Goodnews Bay Mining Co. .....Feb. 69
Gopeng Consolidated, Ltd. .....Dec. 61
Guiana Exploration Co. .....Mar. 41
Granby Consolidated Mining, Smelting & Power Co., Ltd. ..Feb. 25; Mar. 67; Oct. 84; Dec. 67
Granduc Mines, Ltd. ..Feb. 25; Mar. 67; Aug. 60; Dec. 67
Grangesberg Mining Co. .....Apr. 64; Jun. 78
Great Boulder (Pty) Gold Mines, Ltd. ..Apr. 63
Great Western Consolidated N. L. .....Nov. 76
Gulf Sulphur Corp. .....Sep. 87
Gui-For Uranium Mines .....Dec. 68
Gwanda Nickel Syndicate .....Jan. 37

Halkyn District United Mines .....Sep. 94
Hamil Silver Lead Mines, Ltd. ..Apr. 70; Aug. 80
Harmony Gold Mining Co., Ltd. ..May 69; Oct. 77
Harrietville (Tronoh) Ltd. ..Feb. 78; Apr. 64; Dec. 66
Havana Associates, Inc. .....Feb. 58
Hawkeswood Mining Co. .....Apr. 64
Highland-Bell, Ltd. .....Nov. 71
Hill 50 Central N. L. .....Jun. 77; Nov. 74
Hill 50 Consolidated N. L. ....Jul. 87; Nov. 74
Hill 50 Extended N. L. .....Jun. 77
Hill 50 Gold Mine N. L. .....Nov. 74, 76
Hixon Placers, Inc. .....Jan. 65; Jul. 83*
M. A. Hochschild .....Apr. 60
Home of Bullion Mines Pty., Ltd. .....Mar. 76
Hong Kong Tin, Ltd. .....Jul. 80
Honjo Zinc Industry Co. .....Sep. 94
Hudson Bay Mining & Smelting Co., Ltd. of Canada .....Jan. 37; May 66
Hunting Geophysics, Ltd. .....Jun. 78; Aug. 67
Hydraulic Tin, Ltd. .....Apr. 64

Imperial Chemical Industries .....Aug. 59
Indian Copper Corp., Ltd. ..Jan. 67; Apr. 57; Nov. 66
Industria e Comercia de Minerios S. A. ..May 64
Industrial Diamonds of South Africa (1945) Ltd. Dec. 64
The International Nickel Co. of Canada, Ltd. Jan. 65*; Mar. 67, 73; Apr. 33; May 66; Nov. 65; Dec. 33, 68
Iron Mines Co. of Venezuela ..May 65; Nov. 67
Iron Ore Co. of Canada ..May 67; Jun. 80; Aug. 60
Isa Uranium Syndicate .....Sep. 91
Island Mountain Mines Co. .....Oct. 69

Jackson Basin Mining Co. ....Mar. 72; Jun. 80
Jahala Lake Uranium Mines .....Feb. 66
Jantar Nigeria Co., Ltd. ..Mar. 73; Apr. 58; Jun. 85
Japan Mining Co. .....Jun. 73; Jul. 82
Japan Netrogen Mining Co. .....Jul. 82
Japan Steel Tube .....Nov. 76
Jelebu Tin Dredging, Ltd. .....Feb. 64
Jesko Uranium Mines .....Feb. 69
Johannesburg Consolidated Investment Group .... Jun. 85

Kalgoorlie Southern Gold Mines N. L. ..Jul. 85; Dec. 65
Kamogawa Kako .....Feb. 64
Kampong Lanjut Tin Dredging, Ltd. ....Dec. 62
Kamra Tin Dredging, Ltd. .....Jan. 66, 67
Kam-Spar Uranium Syndicate .....Sep. 100
Kamunting Tin Dredging, Ltd. ..Feb. 64; Dec. 61
Kansanshi Copper Mining Co. .....Aug. 70
Kaslo Base Metals, Ltd. .....Aug. 80
Kefa Tin Co., Ltd. .....Feb. 62; Oct. 78
Keymet Mines .....Jun. 80
Kilembe Copper, Ltd. .....Feb. 55; Sep. 90
King Island Scheelite, Ltd. ..Jan. 74; Mar. 77; Jun. 75; Oct. 73
Klano Iron & Steel Works .....Jan. 72
Klerksdorp Consolidated Goldfields Co. ..Apr. 57; Sep. 89
Kloeckner Group .....Feb. 56
Knob Hill Mines, Inc. .....Jun. 80*
Kokan Mining Co. .....Oct. 69
Kolar Gold Mining Co. .....May 64
Konongo Gold Mines, Ltd. .....Aug. 70
Krupps-Demag .....Apr. 56; Aug. 57; Sep. 93

La Luz Mines .....Aug. 63
Lake Asbestos of Quebec, Ltd. ..Jan. 66; Feb. 69
Lake Cinch Mines, Ltd. .....Dec. 67
Lake George Mining Corp., Ltd. .....Jan. 74
Lake Kaginu Mines, Ltd. .....Oct. 70
Lake Nordic Uranium Mines, Ltd. .....Dec. 68
Societe Languedocienne de Recherches et d'Exploritations Minieres .....Feb. 69
Laporte Titanium, Ltd. .....Nov. 72
London Nigerian Mines, Ltd. .....Feb. 62
Leitch Gold Mines, Ltd. .....May 67
Lepanto Consolidated Mining Co. .....Aug. 69
Lepidolite Development Corp. ..Jul. 33; Nov. 65
Lokken Verk .....Oct. 75
Loloma (Fiji) Gold Mines N. L. ..Feb. 75; Oct. 73
Sociedade Mineira de Lombige .....Mar. 73
London & Rhodesia Mining & Land Co., Ltd. .. Mar. 73
London Nigerian Mines, Ltd. .....Oct. 78
London Nyasaland Mining Corp., Ltd. ...Feb. 60
London Tin Corp. .....Jan. 74; Feb. 60
Lone Bachelor Mines .....Oct. 70
Lorado Uranium Mines, Ltd. .....Nov. 71
Lorelei Copper Mines, Ltd. ....Jan. 71; Jun. 83
Lolor Mines, Ltd. .....Nov. 71
Luipaards Vlei Gold Mining Co. .....Feb. 60
Lukut Tin Dredging, Ltd. .....Feb. 64

Mazyan Miners Company, Ltd. .....Dec. 61
Campana Mahuida .....Jan. 72
Mandated Alluvials N. L. .....Sep. 92
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Compania de Manga..eso Oriental Americano .... Oct. 73
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Marcona Mining Co. ..Mar. 60; Jun. 75; Nov. 67
Marinduque Iron Mines .....Jul. 87
Marmoraton Co. .....Sep. 100
Matte Smelters Pty Ltd. .....Mar. 73
Mawchi Mines, Ltd. .....Jan. 63
Mayon Mining Corp. .....Aug. 67
Mazapil Copper Co. .....Mar. 68
Mazoe Consolidated Mines, Ltd. .....Mar. 73
Merriespruit (Orange Free State) Gold Mining Co. Feb. 58; Sep. 89
Messina (Transvaal) Development Co. ..Jun. 83
Metal Export Corp. .....Oct. 68
Metal-Nova Co. .....Mar. 75
Metalkat .....Feb. 60
Mianrai Teoranta .....Jun. 79
MIFERMA .....Sep. 91
Companhia Mineira do Lobito .....Oct. 67
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Mines Development Syndicate .....Nov. 78
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The Mining Corp. of Canada, Ltd. ..Sep. 99; Oct. 70
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Mitsui Metal Co. .....Jul. 82; Nov. 74
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Moina Tungsten Tin Mining Co. N. L. ..Nov. 74
Molybdenite Corp. of Canada .....Nov. 71
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Mount Charlotte (Kalgoorlie) Gold Mines, Ltd. Jun. 77
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Naraguta Tin Mines, Ltd. .....Jun. 85; Oct. 76
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Sherritt Gordon Mines, Ltd. .... Jan. 65; Jun. 79
Sherwood Starr Gold Mining Co. ..... Sep. 91
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(*Continued on page 84*)

Super-Sensitive URANIUM Ore-Lokator

NCA

MODEL RM2N

FEATURES:

- **SENSITIVITY**—.003% uranium; .02 mr/hr.
- **INDICATION**—large 2¼" scale-face meter, neon flasher, audible clicks in headphone.
- **METER RANGES**—500 to 5,000—50,000 counts/min.; 0 to .25—2.5—25 mr/hr radiation dosage.
- **CONTROL**—Single switch; Off-on, 3-meter ranges, Geiger tube voltage.
- **PROBE**—Heavily chrome plated, contains NCA super-sensitive, thin-walled plug-in-type geiger tube.
- **CIRCUIT**—Tropicalized; provides constant voltage to geiger tube largely independent of battery voltage; low drain, gives approx. 400 hr. battery life.

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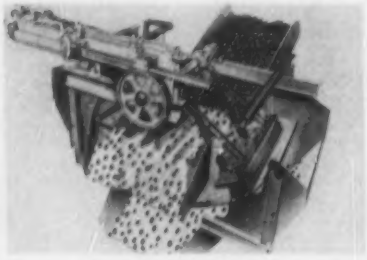
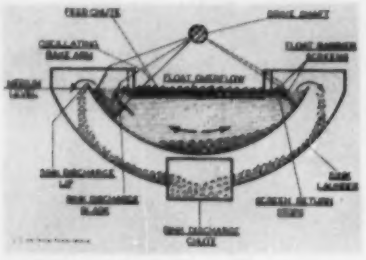
PRODUCTION EQUIPMENT PREVIEW

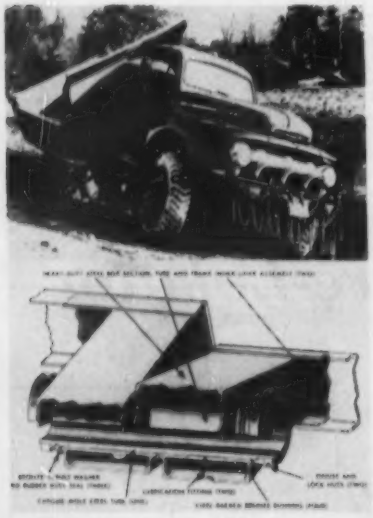
PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.





New HMS Separatory Vessel Now in Production

The Ore & Chemical Corporation has announced a new heavy media separation vessel which is described as combining exceptional simplicity with high efficiency. The company has developed 6 basic designs which range in capacity up to 400 tons per hour. The new machine, known as the OCC Vessel, is driven by means of a hydraulic cylinder actuated by a closed oil pressure system, or by compressed air if desired. Company spokesmen point out that the OCC Vessel's efficient operation results in low power consumption. A minimum of head room is required, and the slow motion of the arms removing the sink product eliminates vibration and the need for heavy foundations. It is self-draining and is, therefor, easily started since no caked medium has to be broken loose. It is said that the pool is exceptionally quiet and the reciprocating motion of the blade prevents eddy currents and turbulence. More information may be obtained by writing to the company at 80 Broad Street, New York 4, N. Y. or by circling No. 68.



Swivel Frame Increases Truck Maneuverability

A revolutionary new "Swivel Frame" that makes it possible for the front and rear halves of a truck to rotate to either side independently has just been announced by the Truckstell Manufacturing Company, Cleveland, Ohio.

The Swivel Frame consists of a heavy duty steel box section, with frame inner-liner, fastened firmly to the forward half of the truck frame. A similar section is fastened to the rear half. Both are joined together by a high strength alloy steel tube which acts as the swivel point for cab and body. For further particulars circle No. 61.

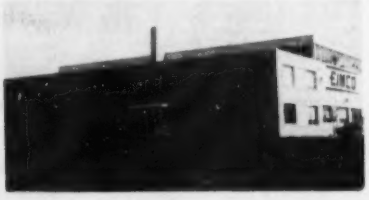
New Light-weight Feeder Delivers High Capacity

Barber--Greene's newly announced "Redi-Flow" vibrating feeder is reportedly capable of handling capacities in excess of 300 tons per hour. It is said that a simple and highly effective mechanical vibrating device makes possible the light-weight, low cost combination.

The unit is made in 20 and 26 inch widths for feeding 24 and 30 inch belts, respectively. Lumps up to 12 inches in size can be handled, when mixed with fines, or to 8 inch maximum when the lumps are of uniform size. For information circle No. 60.

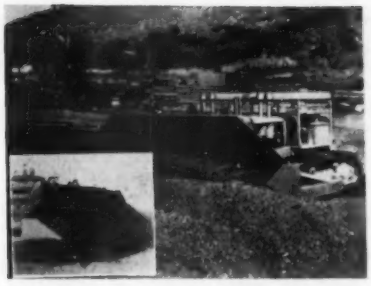
Heil Rock Bodies Used On Trucks At Orinoco Pit

Heil rock bodies are playing a large part in getting the ore out in a hurry from the newly developed iron ore mine at Cerro Bolivar, Venezuela. More than sixteen 20 cubic yard Heil heavy duty rock bodies are used, being mounted on Mack LRSW chassis. The double acting Heil model 2040 hydraulic twin arm hoists dump the big bodies to a 70° angle. For more information on Heil bodies circle No. 67.



EIMCO Builds New Research And Development Center

The Eimco Corporation has completed a new Research and Development Center --the first of its kind devoted exclusively to the service of the process industries in liquid-solids separation through filtration. Every known type of filtration equipment will be at work in this laboratory located at Palatine (Chicago Suburb), Illinois. When research shows that something new can be built for the benefit of the trade, company spokesmen say that engineers will follow it through design and production.

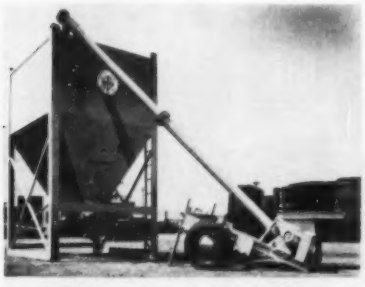


World's Largest Bulldozer Blades Built by Gar Wood

Gar Wood Industries, Wayne, Michigan, reports that they have manufactured the largest bulldozer blades ever produced. The giant dozer has a moldboard measuring 5-feet high and 24-feet long. It is mounted on two Allis-Chalmers HD-20 crawler tractors, which are said to be the largest in regular production today. Each tractor has been welded together to operate as one tractor to supply the power needed to move the material handled. Four of the big twin dozers are already in operation. For more information circle No. 64.

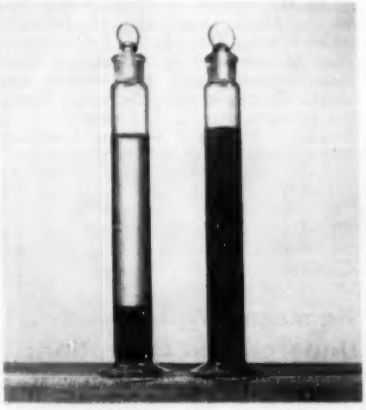
Three Axle Carrier Used For Low-Price Moto-Crane

The Thew Shovel Company, Lorain, Ohio, has just added an all-new, low-priced model to their famous line of Lorain Moto-Cranes, the model Mc-104. Like other Lorain Moto-Cranes, the MC-104 is not limited to lifting crane service only. It is fully convertible to a yard shovel, hoe, clamshell and dragline. Circle No. 44 for further data.



Delta Tank Produces Two-Screw Mobile Conveyor

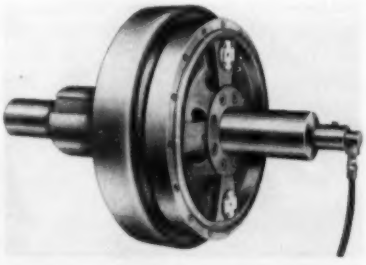
Here is another unit which may solve some problems for the mine operator. The Delta Tank Manufacturing Co. announced development of a portable two-screw granular product conveyor unit capable of handling up to 60 tons of material per hour. The unit's hydraulically controlled elevating screw is adjustable to heights ranging from 6 to 16 feet. The mobile screw conveyor, known as the Ba-zooka, is powered by a two-cylinder engine, and can be moved into position by an auto or light truck. To learn more of this new machine circle No. 65.



Settling Rate Improvement With Dow's Separan 2610

Of particular interest to the mining industry, is Dow Chemical Company's recently announced flocculating reagent Separan 2610. It is reported that this new material may revolutionize the steps necessary to remove solids from water solutions in many industrial applications. Dow Chemical has stated that its use has decreased material losses by as much as 80%, and increase overhead clarity in settling operations by as much as 5 times.

The above picture shows a pulp containing 15% solids. The bottle on the left has been treated with 0.03 pounds per ton Separan 2610, and the picture snapped 30 seconds after treatment. For particulars circle No. 66.



Air Clutch Announced By Dodge Manufacturing Corp.

An air clutch, with unique and exclusive features which establish new standards in quick action and ease of control, is the way that Dodge Manufacturing Corporation describes their new unit.

One of the features reported by the company is the use of a minimum amount of air which produces "finger-tip" control and an ability either to "inch" the clutch or to throw it into full engagement, as required. The new clutch, known as the Air-Grip, provides for mechanical engagement in case the air supply fails. For full particulars circle No. 63.

Notes From The Manufacturers

C. O. CRUMP (left) recently was named president of Sanford-Day Iron Works, Inc., Knoxville, Tennessee manufacturer of mine cars, wheels and other mining equipment. Mr. Crump was head of The Brown-Fayro Company, Johnstown, Pennsylvania, which merged with Sanford-Day in April. He succeeds P. S. McCALLEN, who retired earlier this year. Other officers elected by the firm's board of directors were R. E. JONES, vice president in charge of engineering, and W. D. MOREMAN, vice president in charge of sales.

Ward W. Minkler, formerly Pacific Coast manager of sales and technical service, has been named assistant manager of market development for the Titanium Metals Corporation of America.

Charles A. Mueller, assistant director of research for Lindberg Engineering Company, will take over the position of chief engineer for Western Rock Bit Manufacturing Company in January. The company also announced the establishment of a new commercial heat-treating and brazing department, which will offer the only facilities for that work between Denver, Colorado and the Pacific Coast.

A. G. Lindquist, secretary and comptroller of Gardner-Denver Company, has been elected vice president of the company. He has been with the manufacturing firm for 16 years.

Charles A. Woodley's election to the post of vice president of the Caterpillar Tractor Company has been announced. His responsibilities will include administration direction of the six Caterpillar plants located in the United States.

Peter C. Friend, sales engineer, is being transferred to the San Francisco, California office of Nordberg Manufacturing Company. Prior to this assignment Mr. Friend was located at the Milwaukee, Wisconsin office.

R. M. MILLER, formerly manager of the company's transmission plant, was appointed vice president in charge of sales, production and engineering for Stearns Magnetic, Inc., Milwaukee, Wisconsin. The firm manufactures magnetic separation and power transmission equipment. Mr. Miller has been with Stearns since 1946.

Uranium and Atomic Power Highlight Joint Mining Meetings in Carlsbad, New Mexico

Some 500 registered at the joint convention of the New Mexico Mining Association and Southwest International Mining Association in Carlsbad, New Mexico, October 14-16.

The technical sessions, which were in a great measure devoted to uranium, were well attended and enthusiastically received. Dr. Alberto F. Thompson, Chief, Technical Information Service, Atomic Energy Commission, Washington, D. C., gave an excellent talk on the "Coming Commercial Applications of Atomic Energy." It was estimated that atomic energy will attain importance as a prime mover in the generation of power about 1960. It is expected that much of the new load after that date may be carried by atomic energy. The development of breeder units is being accelerated, and they are expected, eventually, to provide power in areas that cannot be reached economically by central stations.

Robert M. Moore of General Electric Company presented a discussion of "Electrical Equipment Applications to Mining." In this, many recent developments were presented and discussed. Messrs. Harold D. Wolfe, Chief, Albuquerque Sub-Office, A. E. C., and William A. Carlson, geologist, Grand Junction Operations Office of the Commission, presented a paper on "Uranium Prospecting in New Mexico."

Dr. W. E. Shoupp, Assistant Manager, Atomic Power Division, Westinghouse Electric Corporation, gave an illustrated talk on "Development of Reactors and Other Phases in the Utilization of Atomic Energy." This covered the recently authorized generating plant to be built in Western Pennsylvania. He was followed by Paul W. Leach, Midwest Manager, Extension Division, E. I. DuPont de Nemours, who presented an entertaining discussion of "Public Relations Problems Facing Business."

W. H. Goodrich, General Manager, Chino Mines Division, Kennecott Copper Corporation, presented a paper at the Friday luncheon session on "Base Metals and Some Problems," in which he summed up the situation facing industry if the free enterprise system is to survive.

Robert Gray of California Institute of Technology moderated a discussion panel on which "Public and Labor Relations of Industry" were discussed. Panel members were Plato Papps, General Counsel, International Association of Machinists; Milton C. Denbo of Poole, Schroyer and Denbo, both of Washington, D. C.; and Dean Stahmann, farmer of Las Cruces, New Mexico. Questions submitted from the floor indicated intense interest in the discussion.

Entertainment was provided at several functions, and the ladies were guests at several parties at the Riverside Country Club. After a Ranch Style breakfast on Saturday, field trips were made to the several potash mines and to Carlsbad Caverns. The session was concluded Saturday evening at the traditional Suppliers' Party. Some 700 were in attendance to enjoy the hospitality of the business firms that serve the mining industry in the New Mexico and West Texas area.

Several prominent mining men from Mexico attended the convention as guests of the American Metals Company. They were accompanied by John W. F. Dulles, Assistant General Manager, Cia Minera de Penoles, S. A., Monterrey, N. L., Mexico.

At the annual meeting of the New Mexico Mining Association, the following officers were elected: A. J. Thompson, New Mexico Institute of Mining & Technology, president; J. B. Knaebel, Anaconda Copper Mining Company, Grants, 1st vice-president; J. T. Lewis, Jr., U. S. Smelting, Mining & Refining Company, Bayard, 2nd vice-president.

W. P. Morris, Vice President and Assistant General Manager of Duval Sulphur and Potash Company, who had served the association for two terms as president, was elected an honorary director.

Kennecott Will Close Ray Underground Operations

Underground mining at the Ray Mines Division of Kennecott Copper Corporation at Ray, Arizona, will come to an end in January 1955, according to an announcement by A. P. Morris, general manager. After the beginning of the year, copper production will be maintained entirely from the open-pit mine which began producing in October 1951. See MINING WORLD, January 1953, pages 26-29.

Mr. Morris explained that the historic "Number Two" mine, which opened in 1911, would close when mining is completed on the level now being worked because "the ore below that level does not contain enough copper to warrant the high cost of maintaining underground mining operations." The Number Two mine has produced more than 64,000,000 tons of copper ore during its productive life, and at the present production rate will have produced another 250,000 tons by the time of shutdown. Total underground production from all mines since inception of the Ray operation has been 79,000,000 tons.

The Ray Mines Division, from underground and open-pit operations, produced approximately 94,500,000 pounds of copper during 1953. Currently, the company employs about 850 persons at Ray, and 250 at Hayden where the company's concentrator is located. Approximately 200 are employed underground. About 90 workers in the underground department will be retained when the mine is shut down in order to salvage equipment, pipe, rails, and other useful materials, but their jobs will end when the salvage operations are completed. Many of the men now employed underground eventually will be absorbed in other departments of the company's operations at Ray.

Kerr-McGee Opens New Shiprock Uranium Mill

The Navajo Uranium Division of Kerr-McGee Oil Industries, Inc. started its new uranium mill at Shiprock, New Mexico on November 1st. Navajo Uranium has been mining uranium ore in Colorado and Arizona for several years and signed a contract with the United States Atomic Energy Commission for construction and operation of the mill shortly over a year ago.

The new mill will use an acid leach circuit for treatment of sandstone gangue uranium and vanadium ores from the Four Corners area. Navajo Uranium will treat its own ores as well as those of independent miners. A large backlog of ore for milling has been stockpiled at the mill site by the AEC since it opened an ore buying depot in 1952.

The *Ducor Mining and Milling Company* of Prescott, Arizona, has completed a 50-ton concentrating mill at the Poland mine, 15 miles southwest of

Pictured at the annual mining convention in Carlsbad are (left to right) Dr. Alberto F. Thompson, chief of Technical Information Service, U.S. Atomic Energy Commission; A. J. Thompson, New Mexico Institute of Mining & Technology, president of the New Mexico Mining Association; and O. Paul Lance, Lance Engineering Company, president of the Southwest International Mining Association.

Humboldt. The ore carries values in copper, lead, zinc, gold, and silver. Ducor has been engaged in exploration and development work at the mine for the last year and one-half, reopening old workings and drifting on the vein. Fifteen men are presently employed. H. H. Records of Prescott is general manager.

The *Pine Mountain* mercury property near Sunflower, Arizona is said to have been acquired by *International Ore Corporation*. The old plant is being revamped and is about ready to start producing. Fourteen men are employed under the direction of D. W. Simpson, president and general manager, of Wickenburg, Arizona.

The *Hillside Mining and Milling Company* is completing its 500-ton milling plant at the *Tungstona* mine 12 miles northeast of Bagdad, Arizona. Construction of the plant has been in progress for the past year. During this time a shaft has been sunk to a depth of 300 feet below the adit tunnel, levels have been run, and preparations for ore production are now under way. J. C. Lincoln is president of Hillside; Ernest R. Dickie is vice president and general manager; R. C. Bogart is general superintendent.

An exploration grant has been made by the United States Atomic Energy Commission to the *Red Hills* group of 10 claims in the Artillery Peak area of Arizona. The claims, owned by Earl Tate of Yucca, Arizona, are held under lease by Johnson & McBride of Pasadena who have incorporated under the name of *Santa Fe Uranium Company*. The property is located one mile north of the old silver camp of Rawhide in Mohave County and a mile south of Manganese Mesa. High-grade silver ore was mined at the Rawhide in the 1870's. The vein is said to be from 4 to 7 feet wide and to have assayed 0.17 percent U_3O_8 at a depth of 10 feet, while picked samples at 25 feet, the present depth of the shaft, go much higher.

The *Western Mining and Exploration Company* has acquired, under a conditional sales contract, a group of 21 uranium claims in the Cherry Creek area of the Sierra Anchas, near Globe, Arizona. The contract called for a down payment of $8,500 with $500 a month or 10 percent royalty, whichever is greater, with development work to start November 1. C. A. Saylor is president of the purchasing company. Sellers include Kendrick Holder, George Cline, and Nathan and Travis E. Ellison, all of Globe, and Joe Cornett of Roosevelt.

Miners and prospectors are lining up against cattlemen, game protective association officials, and soil conservation men in a dispute over the closing of the 13,152-acre Sierra Ancha Experimental Forest to mineral prospecting. The area is about 40 miles north of Globe, in Gila County, Arizona. The *Arizona Uranium Ore Producers Association* has been formed to represent the miners in the disagreement. The Sierra Ancha was set aside in 1932 for forestry experimental purposes, but in recent months has been the scene of considerable uranium prospecting and mining development. Those who advocate the withdrawal say that it is needed in a study of water yield and erosion control, is part of a national research plan which covers a long period of years, and is just beginning to repay the federal government's investment in the area. Charles F. Willis, secretary of *Arizona Small Mine Operators Association*, has suggested that perhaps withdrawal of only 3,000 acres would be sufficient.

Illinois Zinc Company is negotiating with the Defense Minerals Exploration Administration for an exploration contract at the *Shannon* mine near Gleeson, Arizona. *Shannon Mining Company*, Illinois Zinc subsidiary, has been rehabilitating the old lead-zinc property. The firm reports that there are indications that the Shannon may yield 50,000 to 100,000 tons of high-grade lead-zinc ore, and there are also large tonnages of iron pyrite estimated to contain about 50 percent sulphur. The company plans to move part of its Deming, New Mexico zinc concentrator to the Shannon mine. This unit would be capable of treating about 200 tons of ore per day.

Ten more uranium claims in the Miracle Springs area near Bakersfield, California have been sold. Sellers were Jack and Olive Kerns, and William and Inez Waggoner. Clyde E. Greathouse, acting as agent for the *Great Lakes Oil and Chemical Company*, purchased the claims

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(*Kergon No. 1 through 10*) for $150,000 cash and 10 percent of the gross revenue on all ore mined until a total sales price of $300,000 is reached. The sellers still retain *Kergon 11 through 16*, which Mr. Greathouse has an option to purchase. The claims are located in the same general area as those of the *Miracle Mining Company* sold earlier this year.

About three-quarters of a mile from the Miracle Mining Company's ground, another uranium find has been reported. The claims are designated as the *Hot Rock No. 1 through 10*. Discoverers of the new strike are Walter C. Barnes of Lakewood, R. A. Paulson of Baldwin Park, Dave McCulloch and W. B. Dawson of Whittier. Two outcroppings of autunite mineralization have been found on the Hot Rock No. 2 and 10 claims located on both sides of Highway 178. The mineralization appears rather like an extensive pocket than a localized vein.

Lassen County, California is the scene of the most recent uranium interest in the state. About 100 claims are reported to have been staked in the region around Doyle, in the southeastern part of the county near the Nevada border. One shipment of ore is said to have been made to the AEC at Salt Lake City, with the assay as yet unknown. William M. Compton of San Leandro has staked 12 of the claims in the area; another claim holder is Fred Barker of Sparks, Nevada who reports that he and his partner, Ted Delavega, plan to ship some ore.

Sam Mobley reports the discovery of uranium on Corlieu Warm Springs property near Oakhurst in Madera County, California. Grade has not been revealed. Three companies are doing underground development work, according to Mr. Mobley, and says that production is expected to start soon. He has been doing surface development work in the area for 10 years.

The successful bid for a lease on 10 acres of government land in Kern County, California went to a group of Los Angeles mining men—Harvey S., Henry T., and Seeley G. Mudd. It is reported that they plan to produce borax and to build a plant on the site for processing the material.

Fred and Daniel Giles, operating the *Gold Crown* mine near Alleghany, California, report that their new 50-ton-per-day mill should be in operation early next season, treating stockpiled ores. Sulphides will be shipped to the *American Smelting and Refining Company's* smelter at Selby, California.

Bradley Mining Company has leased its *Reed* mercury mine in Lake County, California to *Cordero Mining Company*. The ten-year lease is on a royalty basis with no provision made for an option to purchase. The Reed has been inactive for some time, but was once a regular producer of between 250 to 300 flasks of mercury per month. The Cordero firm plans to prospect for additional ore bodies.

NEVADA

Titanium Metals Corporation of America has attained its full-capacity production of 10 tons per day at the Henderson, Navada plant. The firm expects to maintain this as a steady rate. Titanium Metals achieved first actual production of titanium sponge at this plant in October 1951. Output of the metal in the United States totaled 2,350 tons in 1953. The new annual rate at Henderson will exceed the combined 1952 and 1953 total output of titanium metal by all companies in the United States.

Sonoma Quicksilver Mines Inc. has started mining operations on the *Turrillas* property in the Hot Spring district 10 miles east of Paradise, Nevada. D. A. Myers is superintendent of the new operation. A well has been drilled, and construction has been completed on a cook house, dining room, bunk house, and change room. A 100-ton Gould rotary furnace is being installed, and open-pit mining has started. Sonoma Quicksilver operates the old *Mount Jackson* mine in Guerneville, California. H. D. Tudor is president of the firm and E. R. Menary is secretary.

The *Western Uranium Corporation* of Reno, Nevada has purchased eight claims in the Belmont district from Lloyd Sammons, Clay and Lester H. Holmes, Keith Douglass and Milton Crooks. The claims, known as the *Eagle* group, will be explored shortly; a drilling rig is now being moved onto the property. A down payment of $3,000 was made with a balance of $100,000 to be paid within six months. President of Western Uranium is Herman Smith, and Hugh D. Connell is vice president.

The new TL shaft of *Eureka Corporation, Ltd.* had reached a depth of 788 feet on October 4th. The shaft is now in Hamburg Dolomite which is the ore-bearing formation of the Eureka district in Nevada. At a depth of 635 feet, 15 gallons of water per minute were encountered. This was at the top of the water table. Present water flow is at the rate of 100 gallons per minute. The TL shaft is midway between rotary drill holes 103 and 106 (500 feet apart), both of which showed ore. Present plans call for sinking the shaft to a depth of 1100 feet with stations at the 850, 950 and 1050 (a pump station has already been installed on the 600 foot level). North and south drifts will be started from the 3 levels, when established, and driven to the location of drill holes 103 and 106 and the ore bodies encountered by those drill holes explored. An underground diamond drilling program is also contemplated and at intervals of 100 feet in the 850 drifts, drill holes will be extended to a depth of 250 feet or more to further explore the mineralized area. It is now expected that sinking of the shaft to its ultimate depth will be completed early in January 1955 and work on the 850 level started before drifting is initiated on the 950 and 1050 levels.

The *Toiyabe Uranium Company* of Round Mountain, Nevada reports the discovery of uranium on its property on the outskirts of Round Mountain, Nye County, Nevada. The ore body has been traced for 600 feet on the surface and has widths up to 75 feet. Core drilling is now going on. President of the firm and one of the original discoverers is John A. Grout. Other officers are Carrol Carrigan, vice president; Russ Kirsan, secretary-treasurer; Mrs. Jane Bixby and Mrs. Eileen Johnson, directors.

D & D Mineral Company has received an order for shipment of 1,000 tons of sulphur to the *M. L. Dudley Company, Inc.* at Mendota, California. The sulphur is mined and milled at Sulphur, Nevada.

Clayton Mendham has purchased 80 acres of patented ground in the Seven Troughs district of Pershing County, Nevada from Albert Silvers and associates of Reno. Mr. Mendham reports he has located a vein of gold-silver ore on the *Industry* claim and is now cleaning out an old tunnel so that he can connect with the vein.

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AEC Expands Three Plants To Treat U_3O_8 Output

The United States Atomic Energy Commission has started a $67,000,000 expansion program to expand feed materials production.

A new plant will be built near St. Louis, Missouri; the Feed Materials Production Center at Fernald, Ohio, will be expanded, as will the feed plant at the gaseous diffusion plant at Paducah, Kentucky.

The St. Louis and Fernald plants will convert the growing supply of high-grade uranium ore and concentrates from Colorado Plateau mills and foreign sources into highly purified uranium compounds of metal.

Kaiser Aluminum Nears Goal in Expansion Program

A $27,000,000, three-year expansion program raising its capacity to over 800,000 tons of alumina per year is nearing completion at the Kaiser Aluminum & Chemical Corporation, Baton Rouge, Louisiana, plant.

The final phase, currently underway, increases the plant's production to provide the alumina requirements of Kaiser Aluminum's reduction plants at Chalmette, Louisiana, and Tacoma and Mead, Washington, with total primary aluminum capacities of more than 400,000 tons per year.

The Baton Rouge enlargement, part of a $230,000,000 privately financed integration and expansion program for Kaiser Aluminum, includes facilities for processing bauxite from the corporation's recently developed mines in Jamaica, British West Indies.

The *White Pine Copper Company* has started operation of its concentrator on its property in Ontonagan County, Michigan. The copper concentrate is being stockpiled pending blowing in of the new smelter furnaces. Underground development work is continuing on schedule. White Pine is a subsidiary of *Copper Range Company*.

Production of concentrate and pebble rock phosphate reached an all-time high for the quarter ended September 30 at the three Florida mines of International Minerals and Chemical Corporation. More production was recorded during this period than in any other three-month period of the division's history.

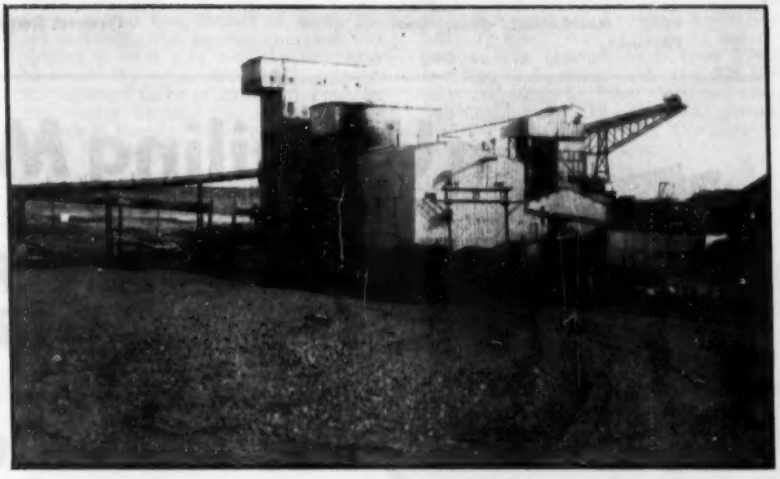
Tennessee Copper Company's new Copperhill sinter plant is now in production. The plant produces sulphur dioxide gas used for making sulphuric acid in TCC acid installations. As soon as the new sinter production equipment was placed in successful operation, it was possible to shut down the older Copperhill sinter plant temporarily for a thorough overhaul and rebuilding of some essential machines. Renovation of the older plant has now been completed and production will be resumed shortly.

Work on expanded facilities at the Kings Mountain, North Carolina, plant of *Foote Mineral Company* is almost completed, and the plant is in the "tune-up" stage. The construction program at the Sunbright, Virginia, plant has reached its peak this quarter and is due to be finished early in 1955. Increased tonnages of spodumene concentrates are currently moving to Sunbright for extraction of lithium values.

With the advent of freezing weather, the last of the iron ore washing plants on the Mesabi Range ceased operations for the season during the week of October 25. Two of the last to shut down were *Pickands Mather & Co.'s* West Hill plant and W. S. *Moore Company's* Prindle plant.

Shipments of iron ore on the Great Lakes totaled 1,750,000 gross tons during the week ended October 25. This compares with 2,505,525 tons in the same period of 1953. Shipments for the season at that date totaled 56,427,582 tons in 1954, and 88,395,643 tons in 1953.

Several temporary steel buildings have been completed and are now in use as offices at the site of the huge $300,000,000 taconite project of *Erie Mining Company* near Aurora, Minnesota. Excavation for the primary crusher and the huge main concentrator building is well along; 1,500,000 tons of granite and earth have been removed so far in plant site excavation. At the harbor site, about 70 miles east of Aurora on the north shore of Lake Superior, 1,250 feet of the northeast breakwater has been completed. The finished breakwater will extend 1,900 feet into the lake, forming one side of the harbor. The first of a series of cofferdams is now under construction. When completed, water within the cofferdams will be pumped out, and deepening of the harbor bottom will go ahead on a dry basis instead of under water.



Synchronous Motors Cut Power Costs on Mesabi

Two synchronous motors have cut costs by $500 per month at a group of four iron ore washing plants on the Mesabi Range. Since their installation in the electrical system serving the four plants (like the one above), the two motors have increased overall power factor from a low of 80 percent to an 86 percent level, safely over the 85 percent penalty limit specified in the company's power contract. Before these synchronous motors went into service, all equipment in the four plants was powered by induction motors ranging in size up to 250-horsepower for the pumps. Normal load averaged a substantial 6,000 kilowatts and energy consumption came to 3,000,000 kw. hours a month. To correct the lower power factor, engineers replaced two induction motors in one of the plants with a pair of 600-hp. Fairbanks-Morse synchronous motors with leading power factor. Although these units operate alternately, they were sufficient to bring power factor for the entire four-plant system up to 86 percent. The motors chosen are designed to operate at constant speed under all load conditions. Each is rated 600 hp., 600 revolutions per minute at 80 percent leading power factor. The power supply is 3-phase, 60 cycle, 2300 volt. Each of the synchronous motors drives directly a 12-inch Hydroseal centrifugal pump designed to handle material containing 25 percent solids. These pumps are alternated for pumping waste tailing through 7,700 feet of 18-inch pipe leading from the plant to the company's huge tailing basin located three-quarters of a mile away. Although 5,000 feet of the flow is by gravity, the pumps have a static lift of 76 feet and operate with a discharge pressure of 90 to 100 pounds per square inch. Normally they handle 446,400 gallons an hour, the solids amounting to about 450 long tons per hour.

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Climax Uranium Expanding Grand Junction Mill

Climax Uranium Company has started construction of an addition to its Grand Junction, Colorado uranium mill under the terms of a contract signed with the United States Atomic Energy Commission. This contract calls for the virtual doubling of plant capacity with first production scheduled within nine months.

Climax Uranium has developed and successfully pilot plant tested an improved process for treating Colorado Plateau ores. The new process will be used in the mill addition.

The cost of expansion is estimated at $1,000,000, according to design engineering completed by the Associated Engineers of Denver, Colorado.

Climax Uranium, a subsidiary of Climax Molybdenum Company, operates its own uranium mines in Mesa and Montrose counties Colorado, and purchases ores from independent miners in both Colorado and Utah.

AEC Opens First Wyoming Uranium Ore Buying Depot

The United States Atomic Energy Commission is building a uranium ore sampling plant at Riverton, Fremont County, Wyoming. First ore is scheduled for purchase early in 1955.

The Commission anticipates that the new station will do much to encourage actual mining of uranium ores in central Wyoming which were discovered in the area in mid-1952.

Ore shipments from the Gas Hills, Crooks Gap, and other central Wyoming districts in the Powder and Wind River Basins have heretofore been shipped long distances to the AEC ore buying depot at Edgemont, South Dakota or two privately owned mills at Grand Junction, Colorado or Salt Lake City, Utah.

First uranium ore shipments by the *Goldfield Development Company* from its *Lucky Strike* leases in Colorado's Calamity Mesa area are scheduled to begin this month. The property covers seven uranium claims. Goldfield Development has acquired interests in uranium claims in Nevada, Utah, and Colorado during recent months.

Mascot Mines, Inc., zinc-lead producer in Shoshone County, Idaho, has purchased the nine-claim Alto property in the Gateway uranium mining district, Mesa County, Colorado. A systematic diamond drilling program is planned.

During the past fiscal year *Rico Argentine Mining Company*, Rico, Colorado completed a total of 9,340 feet of development work and diamond drilling. Of this total 5,161 feet were driven at the *Mountain Springs* property, which produced 35,250 dry tons of lead-zinc mill grade ore. The *Argentine* mine reportedly has a block of ore below the present workings, which has been diamond drilled. In order to make this ore accessible for mining and to open up several other promising areas, the firm has begun extending the *St. Louis* tunnel under it. The company also reported that since 1950 it has mined and shipped 3,500 dry tons of mine run pyrite to uranium mills near Rico.

The *Nellie Bly* gold mine, four miles southeast of Buena Vista, Colorado has been leased to Si Wieman of Olathe. The mine, owned and formerly operated by A. B. Calloway, has been closed for a number of years, but has a previous production record of more than $60,000. Mr. Wieman and a crew of four are now at work at the mine. Ore is found in a vein between a monzonite porphyry and limestone.

A new mine concreting record was set at the *Climax Molybdenum Company*, Climax, Colorado in September when crews poured 6,006 cubic yards of concrete. The crews worked approximately 90 manshifts daily on the Phillipson Level and 33 manshifts on the Stroke Level. Foreman Warren Shriver says that the total for November is expected to reach 7,000 cubic yards.

The *Sammy B* gold mine east of Wheeler Junction, Colorado, has been reopened by the *Moskol Leasing Company* of Denver which recently leased the property from W. L. Davenport, Breckenridge, Colorado. The mine has been idle since 1941, at which time shipments to the *American Smelting and Refining Company* paid just short of one ounce to the ton. Instead of using the old workings, the present operators are driving a short adit into the mountain to reach the vein. Working conditions are expected to be precarious throughout the winter because the entire area is subject to frequent snowslides. A crew of seven men have been hired for the initial work, which includes clearing the ground for a mill.

Bear Creek Mining Company, subsidiary of *Kennecott Mining Corporation*, is continuing geological investigation and appraisal of the Greenback Mountain area in the Bonanza mining district, Saguache County, Colorado. Earlier this year Bear Creek had conducted a drilling program consisting of three holes in the area but abandoned operations when neither hole reached the anticipated formation within reasonable depth. Dr. James Boyd is manager of Bear Creek's explorations from his New York headquarters. (See MINING WORLD, July 1954, page 95.)

Moab Uranium Company, Moab, Utah, reports that it owns or partly owns 552 uranium claims in Grand, San Juan, and Emery counties in Utah where drilling and mining operations are under way at several claim groups. The company has plans to increase its holdings and has entered into contracts with various mining and drilling firms for prospecting and drilling other of its claims.

U. & I. Uranium, Inc., Kellogg, Utah has substantially extended the boundaries of its San Juan County, Utah Radon ore body by recent core drilling. At last report an ore channel more than 1,830 feet long and between 300 and 400 feet wide and up to 14.5 feet thick had been indicated. Ralph W. Neyman, general manager of *Hecla Mining Company*, is vice president of the firm.

Now It's the "Uranium Miner's Boogie"

A minstrel for the uranium miners has appeared on the Colorado Plateau. He is Riley Walker of Blanding, Utah, a former miner himself, who with his "Rockin-R-Rangers" is heard over many of the Plateau juke-boxes giving forth with the "Uranium Miner's Boogie".* Members of the Rockin-R group (shown at right) are (left to right): Gordon Hawkins, Charles "Curley" Gallagher, Belva Nielsen, and Mr. Walker. Their ballad of the Atomic Age goes as follows:

Way out in the state of Utah in Grand County and San Juan
They dig the "yellow stuff" that makes the Atom Bomb.
They do the uranium miner's boogie, the uranium miner's boogie,
It's the uranium miner's boogie, they're dig, diggin' all day long.

Well, every morn' about a half past five, you can see the little towns
Start to come alive, an' do the uranium miner's boogie,
The uranium miner's boogie, it's the uranium boogie,
They're a dig, diggin' all day long.

Well, they jump right out of bed, just like they know they should;
Grab a lunch an' head for "Cottonwood", to do the uranium miner's boogie,
The uranium miner's boogie, it's the uranium miner's boogie,
They're dig, diggin' all day long.

Well, every Spring when things grow slack, they grab a Geiger Counter,
Strap'er to their back, and do the uranium miner's boogie,
The uranium miner's boogie, it's the uranium miner's boogie,
They're dig, diggin' all day long.

Well, there's the V.C.A. and the U.S.V. and don't forget the A.E.C.
It's the uranium miner's boogie, the uranium miner's boogie,
It's the uranium miner's boogie, they're dig, diggin' all day long.

***Available on Atomic Records recorded by Recording Arts, Inc., Salt Lake City, Utah.**

manager of *Hecla Mining Company*, is vice president of the firm.

F. G. McFarland and S. R. Hullinger, Tooele, Utah mine operators, have begun production at the *Maybe* mine, 18 miles north of the *Happy Jack* uranium mine in White Canyon. The mine adit has been driven a distance of 1,800 feet to intersect with the ore body. Ores are now being stockpiled near the portal preparatory to shipment in the near future to the United States Atomic Energy Commission buying station at White Canyon. *McFarland and Hullinger* are operating on a lease from E. J. Hall and Kenneth Bailey, Jr., Monticello mine equipment suppliers.

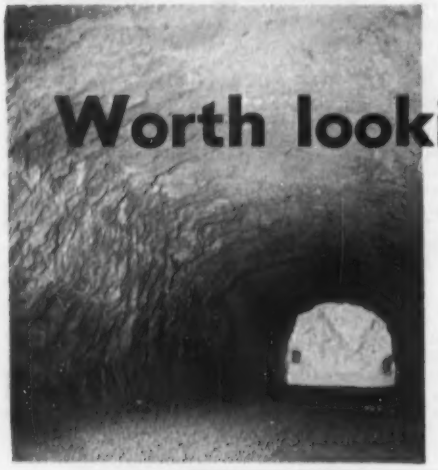
Hidden Splendor Mining Company is the name of the new company formed by *Atlas Corporation* as a result of the recent purchase of Vernon J. Pick's *Delta* uranium mine in Utah's Emery County. Floyd B. Odlum, head of Atlas, serves as chairman of the board of the company. Other officers of the new subsidiary are G. Bradford Palmer, president; Edward R. Farley, Jr., vice president; P. H. Willette, secretary, and Walter A. Lubanko, treasurer. Daily production of 200 tons of ore per day is expected from the mine. (See MINING WORLD, October 1954, page 56, for details of the sale.)

Workings at the *Freedom* mine of the *Vanadium Corporation of America* at Marysvale, Utah have reached a vertical depth of 800 feet, and on the canyon side of the *Prospector* mine, which is on lower ground, a depth of 450 vertical feet has been reached. Vanadium Corporation has leased the *Bullion-Monarch* property adjoining the Freedom group and is conducting exploration work on the property.

Newmont Exploration, Ltd. has acquired a large acreage in the Summit Point area of San Juan County, Utah in conjunction with *Continental Oil Company*. Extensive exploration and development of potential ore deposits are planned by the Newmont group.

Pioneer Gold Mines of British Columbia Ltd., and associates have started drilling in Utah's No Name canyon between White and Red Canyons to prospect for uranium bearing channels in the Shinarump formation. The holdings adjoin the *Happy Jack*, a large producer. Dr. Chris Riley, Vancouver, is geologist in charge.

A new United States Patent has just been granted Herbert M. Fay, Salt Lake City, and Myron R. Gillette, Ogden chemical engineer, for a new heat processing system and furnace for reduction of metallic and non-metallic minerals. Designed to utilize the multiple thermal interval process originally developed by Mr. Gillette for perlite, the furnace features a distributor unit which makes possible simultaneous processing of metallic and non-metallic minerals according to particle size.



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Preliminary development work is being done on a lithium claim in Wyoming's Rattlesnake Mountains north of the Sweetwater River. The property is owned by Bill Marion, Bob Burch, and Mrs. Ruth Stephensen, all of Lander. Spodumene in the ore assays from 6 to 8 percent Li_2O_3; also present are beryl, amblygonite, feldspar, and tourmaline. Drilling and blasting operations are under way and the spodumene will be shipped soon to the Minneapolis, Minnesota plant of the *Lithium Corporation of America*.

Three cars of ore recently shipped to the United States Atomic Energy Commission's buying station at Edgemont, South Dakota from the *Lucky Mc Uranium Corporation* were settled at 1.01, 1.26, and 1.34 percent U_3O_8. Recent open-pit work at the property located approximately 50 miles east of Riverton, Wyoming has exposed a five-foot-thick bed of uranium ore 40 feet below the surface in an open pit. Previously, surface ore showed high radioactivity but contained low mineral values since it was out of equilibrium. Two truckloads of ore shipped earlier to the Edgemont station were settled for 2.18 and 2.93 percent U_3O_8. *Silver Buckle Mining Company*, Wallace, Idaho recently acquired 160,000 shares in Lucky Mc with a two-year option to purchase an additional 10,000. *East Utah-Oil Incorporated* and *New Park Mining Company* are also interested in the property. In the Silver Buckle transaction Lucky Mc received $10,000 in cash and a 640-acre state lease in San Juan County, Utah which has been optioned to *Newmont Exploration Corporation*, a subsidiary of *Newmont Mining Corporation*.

Triple Super-Phosphate Plant Planned for Idaho

A $3,000,000 plant to manufacture triple super-phosphate fertilizer is planned for southeastern Idaho's Bear Lake County by Jefferson Lake Sulphur Company of New Orleans.

The proposed plant would have an annual capacity of about 80,000 tons of high-analysis phosphate fertilizer. Construction is scheduled to start early in 1955 and be completed in about 10 months.

Phosphate rock would be obtained from the Idaho-Utah-Wyoming tri-state area; sulphur from the company's Gulf Coast or New Manderson, Wyoming installations.

George F. Wilkins of Worland, Wyoming is vice president in charge of the firm's western operations.

Northwest Association Holds Annual Meeting

Karl W. Jasper, Spokane mining man, is general chairman of the Northwest Mining Association's annual convention for the second consecutive year. The meeting is being held in Spokane December 3 and 4. He is president of the association and head of Grandview Mines and Metaline Mining and Leasing Company.

Frank N. Marr is program chairman; Robert J. Towne, arrangements chairman; E. K. Barnes and David Watson, finance committee chairmen, and Mrs. W. Randolph Green, general chairman of the ladies' program. All are of Spokane.

Silver Star-Queens Mines, Inc., of Bellevue, Idaho at last report was raising in milling grade ore and driving two exploration headings. A considerable amount of retimbering and other repair work has been done this year. Supplies have been put in to permit winter operations. N. T. Davis is president and general manager.

New Rainbow Mining Company, developing the old *Weber* mine near Lakeview, Idaho, is stockpiling silver-gold-lead-zinc ore from a two-compartment raise and carrying on two exploration headings. A snow-shed has been constructed and a bulldozer will be purchased for winter snow removal. Purchase of a stoper and hoist also are planned. Robert B. Austin of Wallace is president and manager.

The *Sullivan* electrolytic zinc plant near Kellogg, Shoshone County, Idaho, has increased its output 25 percent and resumed full production. One unit of the plant was shut down last summer. Company officials said 60 men have been added to the pay roll because of better demand for zinc and more stable prices.

Sunshine Mining Company's new operating level at a depth of 3850 feet has proved the downward continuation of ore bodies in the No. 8 vein and in the Omega area of the Chester vein. Grade is about the same as on the 3700-foot level above. Development of the famed Sunshine vein has not yet been started on the new level. Production in the Omega area is shared equally with *Polaris Mining Company*. Ross D. Leisk is vice president and general manager of the Shoshone County, Idaho firm.

Sunshine Mining Company and *Polaris Mining Company* have joined other Coeur d'Alene mining region firms in going on a 40-hour work week, leaving only *Lucky Friday Silver-Lead Mines* still on a 48-hour week. Employees were receiving time and one-half for the extra day. All operators in the district granted wage increases in the fall.

Sun Valley Mining Corporation has uncovered radioactive ore in its *Happy Day* property west of Hailey, Idaho. Assay reports have been encouraging. At last report, miners were completing a connection between the old *Red Elephant* and *Durango* mine tunnels. Louise Lindsey of Jerome is secretary-treasurer.

Bunker Hill & Sullivan Mining and Concentrating Company has done more than 1,700 feet of crosscutting on the new 3200-foot level of its *Crescent* mine on Big Creek, Shoshone County, Idaho. A total of 9,000 feet of southerly and northerly crosscutting is planned. Stanley McDougall is manager of mines for Bunker Hill; E. B. Olds is Crescent mine foreman.

Lucky Friday Silver-Lead Mines Company has about 900 feet to go to complete the raise of its new three-compartment shaft to the main adit level. Progress is about 100 feet monthly. Mine production is being maintained at about the 125 tons per day capacity of the old shaft. Development work on the new bottom 2300 level has been suspended temporarily to permit opening of an intermediate level at the 2150 horizon. Exploratory diamond drilling of the adjoining *Hunter Creek Mining Company* property has been carried on from the 2000 level. Dave Elder is superintendent. The property is east of Mullan, Shoshone County, Idaho.

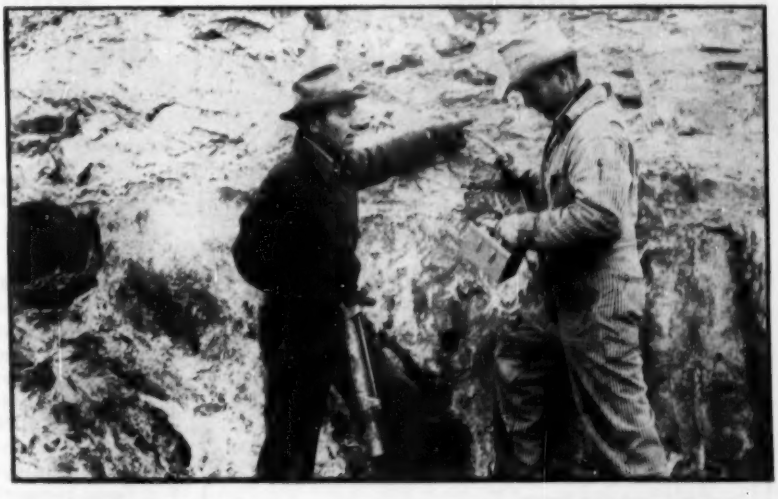
Western Ore Reduction Company has been incorporated by Fred H. and Earl W. Shirts of Hailey, and Allen E. Mecham, Royden G. Derrick and Horace A. Christiansen, all of Salt Lake City.

Robert G. Walker and Howard H. and Glenera H. Braden, all of Coeur d'Alene, have organized a new Idaho mining firm, *Stand Pat*. Capital stock was listed at $25,000.

Lessees are mining lead and zinc on a small scale at the *Little Pittsburg* mine in the Pine Creek district of the Coeur d'Alene mining region, Shoshone County, Idaho. They are doing the work under sub-lease from *Mascot Mines, Inc.* which has a lease from *Pine Creek Lead-Zinc Mining Company*. Claude E. Nugent is secretary-treasurer of the latter firm.

Oxford Uranium Corporation, Boise, Idaho has been incorporated by C. A. Arnim, E. V. Schettle, and A. and A. H. Rosenham, all of Midvale, Utah, and Gustave Busch, Las Vegas, Nevada, with listed capital stock of $250,000.

Gypsy Queen Mining Corporation has opened tungsten ore in Granite County,



Uranium Discoverers Point Out Washington Site

John and James LeBret are pictured at the site of Washington State's most promising uranium discovery. It is located in the Spokane Indian Reservation about 60 miles northwest of Spokane. The ore minerals (autunite and torbernite) occur along contacts of argillite and granite. Less than a foot of soil covered the ore-bearing rock, and a bulldozer is now stripping the property. Together with four other members of the Spokane Indian tribe, they have formed Midnight Mines to develop the discovery. (See MINING WORLD, November 1954, page 93.) They have leased 570 acres of the tribal land which is open to prospecting only for tribal members. Manganese has also been found on the reservation in southwestern Stevens County. Preliminary tests of low-grade samples at the Washington State College mining experiment station indicate that the ore can be concentrated by flotation to at least 48 percent. No work has been done to determine the extent of the deposits.

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west of Deer Lodge, Montana. A bulldozer uncovered a promising surface showing and cleaning out of a 500-foot tunnel driven 30 years ago by a gold prospector disclosed a vein containing mostly scheelite. Operations have been suspended for the winter. Eight claims were staked by Verne C. Homad, Mead, Washington, and Henry L. Pitman, Deer Lodge, following several months' prospecting. The two men, together with Fred J. Wood of Cleveland, Ohio, incorporated the firm in August with capitalization of $1,000,000. Mr. Pitman is company president; Mr. Homad is vice president, and Mr. Wood is secretary.

Construction of the *Anaconda Aluminum Company's* plant at Columbia Falls, Montana has reached the halfway point. Production is expected to begin next July. At *Anaconda Copper Mining Company*, limited amounts of copper and zinc ore were produced this fall after an eight-week strike had tied up operations in Butte. Much repair and maintenance work had to be done in the mines before full production could be resumed.

Kenneth Davis and Elroy McCaw who purchased the claims of the old *Lucky Tiger* company on Pioneer Creek near Pioneer, Montana, have obtained financial backing from a Chicago group and have formed the *Montana Gold and Chemical Company*. A 400-ton dredge has been moved to the area from Folsom, California. They plan to explore the creek bed about three miles north and one mile east of the first real gold workings in Montana Territory. The firm has purchased the old Wall City a few miles from Pioneer, and is remodeling it to provide housing and office space.

The *Norwich* mine on the western edge of the Butte, Montana district is now producing at the rate of 1,000 to 1,200 long dry tons of manganese-silver ore per month. The material is being shipped to the plant of the *Domestic Manganese and Development Company* located in Butte, and which serves as a government depot for the manganese stockpiling program. For the past two years the mine has been the scene of considerable development work of a major nature. Now work is concerned primarily with stopping its measured ore reserves which have been disclosed in significant quantity. About 20 men are employed and the operation is on a six-day-per-week basis. The property is held under lease and option by Messrs. I. G. Irving and R. H. Nelson, geologists and mining consultants. Mr. Irving acts as manager and Mr. Nelson as general superintendent.

Bear Paw Development Co., Great Falls, Montana, has been incorporated with authorized capitalization of $50,000. Homer Pike and A. B. Dirkes of Great Falls, and Frank Glasser of Lloyd are directors.

Dr. R. Farnsworth of Bozeman, Montana and associates are reported to be doing some exploration work on the *Alfaleta* claim near Virginia City, Montana. Some gold ore has been discovered and the results look encouraging.

Treasure Mines and Oils, Inc. has about 5,000 acres under lease near Vananda, Montana which reportedly under test indicate more than 1,000,000 tons of bentonite on the surface. The company plans to install a large mill, dryer, and sackers on the C.M. & St. P. Railway which parallels the field two miles to the north. Fred Briggs of Billings is president of the recently organized firm.

At three separate sales recently, the government-owned deposits of phosphate in Montana were offered for lease through sealed bids. Included in the group were about 2,330 acres six miles southeast of Lakeview, Beaverhead County; 400 acres of unsurveyed land six miles west of Divide, Beaverhead County; and 865 acres four miles northeast of Maxville, Granite County.

Sunshine Mining Company, big North Idaho silver producer, has made a trial shipment of tungsten ore from its Storm Lake exploration project between Anaconda and Philipsburg, Montana to the Walkerville concentrator of *Contract Milling Company* of Spokane. Sunshine has deepened the 100-foot mine shaft an additional 100 feet and done about 500 feet of drifting and some diamond drilling on the new level.

Contract Milling Company's semi-portable concentrator at the *Marget Ann* mine in the Walkerville area near Butte, Silver Bow County, Montana, has started handling lead-zinc-silver and tungsten ores from other properties on a custom basis. The plant has been treating about 75 tons of gold-silver-lead ore daily and at last report was preparing to make a flotation concentrate of manganese from Marget Ann mine ore for *Mitchell Mining Company* of Mount Vernon, Washington. Work for the Mitchell firm has been on a cost-plus basis. J. Stanley Huckaba, Spokane mining engineer, heads the milling firm.

WASHINGTON

Pend Oreille Mines and Metals Company of Spokane, Washington after stockpiling zinc concentrates for a year because of low zinc prices, recently resumed shipments to the Sullivan electrolytic zinc plant near Kellogg, Idaho. Two railroad cars were being loaded out daily at last report. The company concentrator north of Metaline Falls, Pend Oreille County, is treating about 1,600 tons of ore daily. L. P. Larsen is president and W. L. Ziegler, general manager.

Tungsten exploration work on Blue Grouse Mountain, 37 miles north of Spokane, is being continued by *Sunshine Mining Company*. A crew is following a vein showing some huebnerite (manganese-tungstate).

Kromona Mines Corporation has resumed operation of its 100-ton flotation mill in the Sultan mining district, Snohomish County, Washington. Copper concentrates are being trucked to the Tacoma smelter of ASARCO. Tungsten concentrates are being stockpiled pending a decision on installing additional equipment for greater recoveries. Work this year has included 1,000 feet of underground development and installation of a new electric hoist between mill and mine workings at 2,000 feet higher ele-

(*Continued on page 89*)

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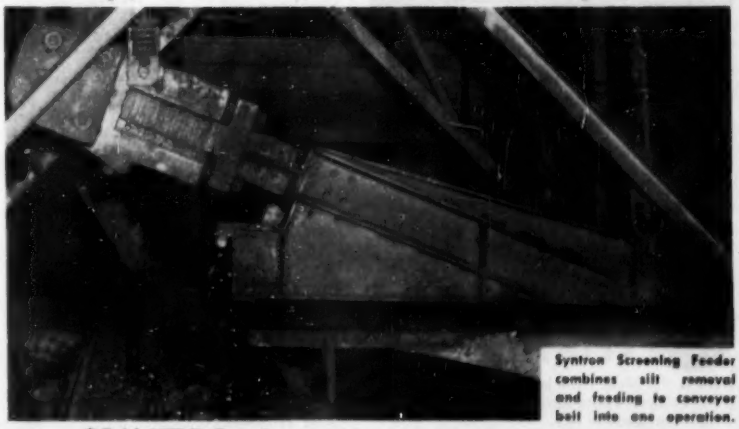

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Arizona Utah Mines Co. ..... Jul. 99
Argentum Mining Co. .....Feb. 98; Apr. 77
Argunum Mining Co. ..... Mar. 91
Argyle Mining & Milling Co. ..Aug. 80; Sep. 113
Arkansas Mining & Exploration Co. .....Aug. 77
Armour Fertilizer Works .....Feb. 85
Arrowhead Uranium Co. ..... Apr. 77
Ashland Mining Corp. ..... May 82
Athletic Mining & Smelting Co. Mar. 87; Aug. 82
Atlas Corp. .....Jun. 95; Aug. 80; Dec. 80
Atlas Mining Co. ..... Oct. 82
Atlas Uranium Co. ..... Apr. 69
Atomic Power Uranium Corp. ..... Sep. 115
Austin-Meyer Corp. .....Mar. 95; Aug 85

B. S. & K. Mining Co., Inc. ..... Oct. 89
Badget Mining Co. ..... Jul. 105
Bagdad Copper Co. ..... Apr. 77
Baker & Co., Inc. ..... Jun. 92
Bald Mountain Mining Co. ....Feb. 88; May 74
Baltimore-Camas ..... Jun. 96
Banner Mining Co. ..Jan. 93; Apr. 77; Aug. 82
Barium Products, Ltd. ..... Nov. 98
Bear Creek Mining Co. ..Jun. 91, 93; Jul. 95, 97; Dec. 79
Bear Paw Development Co. ..... Dec. 83
Beavertail Mining Corp. ..... Aug. 86
Bennett Mining Co. ..... Jun. 92
Bethlehem Steel Co. Mar. 87*; May 81; Nov. 37
Big Eight Mining Co. ..... Oct. 82
Big Indian Uranium Co. ..... Sep. 119
Big Q Tungsten Mine, Inc. ..... May 80
Big Seven Co. ..... Jan. 92
Bigger Butte Mining & Milling Co. ....Apr. 76
Black Hawk Uranium & Metal Co. ..... Oct. 85
Black Hills Tin Co. ..... Feb. 88
Black Mountain Uranium Co. ..... Oct. 89
Black Rock Mining Corp. .....Feb. 98; Oct. 89
Blue Creek Mining Co. ..... May 83
Blue Ridge Mica Co. ..... Nov. 89
Bonanza Oil & Mine Corp. ....Aug. 86; Nov. 95
Border Lord Mining Corp. ..... Aug. 86
Bore Tree Saddle Asbestos Co. ..... Jan. 93
Bolder Tungsten Mine, Inc. ..... Jul. 95
Boundary Silver & Lead Mines ..... Jun. 89
Bradley Mining Co. .....Sep. 109; Dec. 76
Bridger-Jack, Inc. ..... Jun. 95
Bristol Silver Mines Co. ..... Jun. 94
E. L. Brown & Co. ..... Feb. 87
Browns Lake Mine ..... Jun. 89
Buckman Laboratories, Inc. ..Jul. 101; Oct. 89; Nov. 95
Bullion Uranium Co. ..... Oct. 86
Bunker Hill & Sullivan Mining & Concentrating Co. ..Feb. 91, 92; Mar. 93; May 78; Jul. 91; Aug. 85; Oct. 82, 83; Nov. 93; Dec. 81
Butte Western Mining Co. ..Apr. 75; Jun. 89; Jul. 93
Byrd Petroleum Corp. ..... Sep. 113

C & C Tungsten Mining Corp. ..... Jan. 95
Cal Uranium Co. ..Mar. 86; May 75; Sep. 119
Caledonia Silver-Lead Mining Co. ....Mar. 86; Jun. 96; Oct. 82, 87
Calera Mining Co. ....Mar. 83, 93; Apr. 73; Sep. 108
California Quicksilver Mines, Inc. ..... Nov. 95
California Tungsten Corp. ....Jan. 95; Jul. 102
Callahan Lead-Zinc Co. ..Jan. 91; May 78, 81; Sep. 108
Calumet & Hecla, Inc. ..Apr. 71; May 81; Aug. 81; Oct. 41, 90
Calunite Corp. ..... Sep. 119
Can-Du Uranium Co. ..... Oct. 85
Canoncito Uranium Corp. ....Jun. 94; Aug. 81
Carborundum Co. ..... Apr. 71
Castle Dome Copper Co. .....Jan. 3; Mar. 91
Castle Rock, Inc. ..... Jan. 100
Castro Chrome Associates ..... Mar. 89
Centennial Development Co. ..... Apr. 33
Central Eureka Mining Co. ..... May 74, 76
Centrida Mines, Inc. .....Apr. 73; Oct. 82
Chapman & Wood ..... Oct. 90
Cherokee-Utah Uranium Corp. ..... Oct. 85
Chester Mining Co. ..Jan. 97; Apr. 73; Nov. 93
Chester Wright Mining Co. ..... Oct. 89
Chewelah Copper Co. ..... Jan. 97
Chief Consolidated Mining Co. ..... Jun. 95
Chief Uranium Co., Inc. ..... Oct. 90
Cimota Exploration Co. ..... Sep. 115
Clayton Silver Mines .....Apr. 75; May 78
Clearwater Mines, Inc. ..... Jun. 89
The Cleveland-Cliffs Iron Co. ..Jan. 88; Mar. 88; Apr. 72; May 82; Aug. 78; Sep. 108
Climax Molybdenum Co. ..Feb. 23; Mar. 83; Apr. 69; Jun. 95; Nov. 85, 91; Dec. 79
Climax Uranium Co. ..Jan. 89, 91; May 83; Jun. 95; Jul. 96; Aug. 80; Oct. 87; Nov. 85; Dec. 79
Clugston Creek Mining Co. ..... Aug. 86
Coeur d'Alene Mines Corp. ..Jun. 89; Aug. 85; Oct. 83
Coeur d'Alene Silver Giant ..Feb. 88; Mar. 86; Jun. 96; Oct. 82
Colitz Mining Co. ..... May 75
Colorado Exploration Co. ..... May 83
Colorado Fuel & Iron Corp. ..Jan. 85; Jun. 94, 96; Aug. 80
Colorado Mining Corp. ..... Aug. 79
Columbia Lead & Zinc Mining Co. .....Apr. 76
Columbia Mining Co. ..... Feb. 93
Combined Metals Reduction Co. ....Jun. 95, 96
Conconully Mines, Inc. ....Oct. 84; Dec. 89
Consolidated Chollar Gould & Savage Mining Co. ..... May 74
Consolidated Eureka Mining Co. Apr. 79; Sep. 106
Consolidated Virginia Mining Corp. ....Nov. 88
Consolidated Uranium Mines, Inc. ..Mar. 86; Nov. 85
Continental Iron Mining Co. .....Jan. 93*
Continental Iron Ore Co. ..... Feb. 97
Continental Sulphur & Phosphate Corp. Jul. 103
Continental Uranium Co. ..... Jun. 95
Continental Uranium, Inc. ..... Oct. 90
Contract Mining Co. ..May 79; Jun. 90; Aug. 85; Sep. 112; Dec. 83
E. W. Coons Co. .....Oct. 92
Copper Cities Mining Co. ..Jan. 93; Mar. 91; Jul. 99
Copper Creek Consolidated Mining Co. ..Apr. 77; Sep. 105
Copper Queen Mining Co. Feb.93
Cordero Mining Co. ..Sep. 111; Oct. 83; Nov. 95; Dec. 76
Cordillera Corp. ..... Jan. 91
Cornucopia Gold Mines ..... Nov. 88
Coronado Mines, Inc. ..... Jun. 93
Cramet, Inc. .....Jan. 87; May 81
Crane Co. ..... Sep. 108
Crescent Uranium Corp. ..... Jun. 95
Cucamunga Scheelite Corp. ..... Nov. 98
Cuyuna Ore Co. ..... Jan. 88
Cyprus Mines Corp. .....Jan. 93; Nov. 37

D & D Mineral Co. ..... Dec. 76
Daniel Mining & Development Corp. ....Jun. 91
Darwin Consolidated Tungsten, Inc. ....Sep. 105
Dasco Mines Corp. ..... Aug. 82
Davis Mining Enterprises ..... Mar. 87
Davisno Chemical Corp. ..... May 81
Day Mines, Inc. ..Jan. 97; Mar. 93; Apr. 73; May 78; Jun. 89; Aug. 85; Oct. 83, 84
Deer Park Mines, Inc. ..... Feb. 93
Defense Metals, Inc. ..... Oct. 82
Del Mundo Uranium Development Co. ..Oct. 86
Deming Mines, Inc. ..... Oct. 90
Deseret Salt Co. ..... Apr. 69*
Diable Uranium Corp. ..... Oct. 85
Diamond Corp., Inc. ..... Apr. 81
Dodge Construction Co. ..... Jan. 95
Dodge Uranium Corp. ..... Nov. 87
Domestic Manganese & Development Co. ..... Dec. 83
Dow Chemical Co. ..... Aug. 80
Doyle Uranium Corp. ..... Jun. 95
Dragon Consolidated Mining Co. ..... Oct. 86
E. I. du Pont de Nemours & Co, Inc. ..Mar. 87; May 53, 81
Ducor Mining & Milling Corp. ....Mar. 91, 93; Dec. 74
M. L. Dudley Company, Inc. ..... Dec. 76
Duval Sulphur & Potash Co. ..Feb. 95; Mar. 92; Jun. 92

Eagle Picher Co. ....Feb. 95; Mar. 91; Oct. 41
East Utah Mining Co. ..... Jan. 91
East Utah-Oil, Inc. ..... Dec. 80
Edgemont Mining Co. .....Apr. 70; Sep. 115
Edith Murray Mining Co. ..... May 78
Edna Coal Co. ..... Oct. 85
El Oso Mines ..... Apr. 77
Electro Metallurgical Co. ....Jun. 92; Aug. 77
Elkhorn Mining Co. ..... Feb. 93
Elva Mining Co. ..... Jan. 100
Erie Mining Co. ..Jan. 85; Feb. 85; Apr. 71; May 75*; Jul. 97; Dec. 77
Ermont Mines, Inc. ..... May 74
Eureka Corp., Ltd. .....Apr. 77; Dec. 76

Fairhaven Minse ..... Sep. 111
Fall Creek Uranium Corp. ..... Oct. 82
Federal Facilities Corp. ..... Sep. 106
Federal Uranium Corp. ..... Aug. 80
Filtrol Corp. ..... Oct. 86
Flanders Mining Co. ..... Nov. 87
Flint, Tungsten, & Silver, Inc. ..... Oct. 82
Foley Brothers, Inc. ..... Apr. 71

Food Machinery & Chemical Corp. ..Aug. 81; Sep. 118; Nov. 98
Foote Mineral Co. ..Jul. 97; Nov. 91; Dec. 77
Four Corners Uranium Corp. ..May 85; Oct. 85
Four States Uranium Corp. .....Nov. 87
Foutz Uranium Mining Co., Inc. .....Nov. 87
Freeport Sulphur Company ..Jan. 87*; Feb. 56, 98; Mar. 92; Apr. 71*; Aug. 65; Sep. 89; Dec. 56
Fremont Mining & Metals Co. Jan. 89; Sep. 120
Fremont Petroleum Co. .....Jan. 89
Frontier Mines .....Sep. 111

Gabbs Exploration Co. .....Jan. 95
Galigher Company .....Jan. 91; Jul. 95
Garnet Tungsten Mining Co. .....Apr. 79
Gaston Chemical Co. .....Nov. 91
Gem Monazite Mines Inc. .....Jul. 91
Geo Engineering Co. .....Aug. 80
Geological Exploration Co., Inc. .....Mar. 41
Geophysical Minerals Exploration Co. ....Jul. 92
Geoprofessional Services, Inc. .....Jul. 96
Gerco Co. .....Mar. 96
Germania Consolidated Mines, Inc. ....Jul. 94; Sep. 109*
Getchell Mine, Inc. .....Jul. 105; Nov. 98
General Chemical Co. .....Jul. 105
Giles Brothers .....Dec. 76
Robert N. Gillespie & Co. .....Jun. 94
Glidden Co. .....Oct. 92
Globe Iron Co. .....Feb. 85
Golconda Lead Mines Apr. 73; May 78; Aug. 85
Gold Hill Exploration Co. .....Jan. 92
Gold King Mine .....Jun. 90
Gold Metals Consolidated Mining Co. ..Aug. 81
Golden Anchor Mining & Milling Co. ..Sep. 111
Golden Cycle Corp. .....Feb. 87; Sep. 113
Goldfield Consolidated Mines Co. .....Jul. 94
Goldfield Deep Mines Co. .....Feb. 96
Goldfield Development Co. .....Dec. 79
Goldstone Mining Co. .....Apr. 75; Aug. 85
H. W. Gould & Co. .....Apr. 77
Gramlich Exploration Co. .....May 80; Jul. 96
Gramlich Minerals, Inc. .....May 85
Grand Deposit Mining Co. .....Oct. 90
Grandview Mines ..Mar. 93*; Jul. 94; Aug. 86
Granite Mining Co. .....Jul. 93
Grant County Chrome Corp. .....Jun. 90
Great Lakes Carbon Co. .....May 80; Jul. 101
Great Lakes Oil & Chemical Co. .....Dec. 75
Great Western Consolidated Mining & Milling Co. .....Jun. 93
Green River Uranium Co., Inc. .....Aug. 80
Greenan Placers .....Feb. 97
Greenhorn Mountain Development Co. ..Oct. 84
Gypsy Queen Mining Corp. ....Oct. 83; Dec. 81

H. M. & S. Milling Co. ..Jan. 91; Feb. 92; Jun. 96.
Haile Mines, Inc. .....May 77
Haley Young Mining Co. ..Jan. 88; Mar. 88; Oct. 92.
Hanna Coal & Ore Co. ..Jan. 100; Apr. 71; Jun. 80; Jul. 91.
The M. A. Hanna Co. ..Jan. 87, 88; Mar. 88; Apr. 72; Jul. 97; Oct. 92.
The M. A. Hanna Co., Agents .....Aug. 77
Hanna Nickel Smelting Co. ..Jan. 100; Jul. 91
Hanni Mining Co. .....Feb. 92
Harris & Bumgarner .....Jul. 94
Hayden Hill Consolidated Mining Co. ..Oct. 82; Nov. 93.
Haystack Mountain Development Co. ..Jul. 95; Nov. 95.
Hecla Mining Co. ..Feb. 91, 92; Mar. 93; May 78; Jul. 91; Oct. 82.
Hegeler Zinc Co. .....Oct. 91
Helmke-Thomas-Jansen Co. .....Jan. 93
Hidden Splendor Mining Co. .....Dec. 80
Highland-Surprise Consolidated Mining Co. ..Mar. 95; Apr. 73; May 78; Oct. 82.
Hillside Mining & Milling Co. .....Dec. 75
Homestake Mining Co. ..Mar. 72, 83; Apr. 33, 69; May 74; Oct. 41.
Hope Silver-Lead Mines, Inc. ..Feb. 92; Jun. 89
Horizon Titanium Corp. .....Aug. 78
Hot Rock No. 1 through 10 .....Dec. 76
Howe Sound Co. ..Jan. 97; Mar. 83, 96; Apr. 76
Humble Oil & Refining Co. ..Aug. 57; Nov. 71
Humphreys Gold Corp. .....Jun. 91
Hunt Oil Co. .....Apr. 69
Hunter Creek Mining Co. .....Jul. 91
Hunter Silver-Lead Mines, Inc. .....Sep. 109
Hypotheek Mining & Milling Co. ..Feb. 91; Oct. 82, 87.

Idaho Consolidated Mines, Inc. Apr. 73; Oct. 83*
Idaho Custer Mines, Inc. .....Jul. 92; Sep. 109
Idaho Goldfields, Inc. ..Feb. 92; Jul. 92; Aug. 85
Idaho-Maryland Mines Corp. ..Jan. 93; May 74, 76; Jul. 101.
Idaho Mining Co. .....Apr. 75
Idaho Perlite .....Sep. 111
Idarado Mining Co. .....Mar. 84
Ideal Cement Co. .....Nov. 98
Illinois Zinc Co. ..June 93; Aug. 81*; Nov. 67; Dec. 62, 75.
Imperial Uranium Co. .....Oct. 85
Index Daley Mines Co. .....Apr. 73
Inland Steel Co. .....May 82; Jun. 92; Aug. 77
Inspiration Consolidated Copper Co. Feb. 95; Apr. 77; Jul. 99; Aug. 81, 82.
Inspiration Lead Co., Inc. May 79; Aug. 80; Oct. 82, 87.
Intermountain Associates .....Oct. 90
International Minerals & Chemicals Corp. Jan. 87 Feb. 85; Mar. 87; Apr. 71, 81; May 74; Jun. 91, 94; Sep. 107; Nov. 89
International Ore Corp. .....Dec. 75
International Smelting & Refining Co. ..Apr. 77; Sep. 117
Inter-State Uranium, Inc. .....Oct. 85
Ione Mining Co. .....Feb. 92
Isbell Construction Co. .....May 77
Jack Waite Mining Co. ..Jan. 97, 100; May 78
Jaquays Mining Corp. .....Jan. 93
Jefferson Lake Sulphur Co. ..Sep. 120; Dec. 80
Jenkins & Hand .....Jan. 89
John Day Mining Co. .....Feb. 94
Johns-Manville Co. ..Jan. 100; May 80; Aug. 82
Jones & Laughlin Steel Corp. ..Jun. 71, Sep. 108; Oct. 92

Kaiser Aluminum & Chemical Co. ....Feb. 94, 96, 97; Aug. 82, 83; Oct. 90; Dec. 77
Kaiser Magnesium Co. .....Oct. 80
Kaiser Steel Corp. .....Jun. 93*; Sep. 105*
Kathy Jo Mining Co. .....Nov. 85
Kawecki Chemical Co. .....Nov. 91
Kenite Corp. .....Jun. 90
Kennametal, Inc. .....Feb. 58; Aug. 82
Kennecott Copper Corp. ..Jan. 93; Feb. 56, 58, 95, 96; Mar. 41, 83, 89, 92; Apr. 60, 77, 79, 81; Jul. 83, 99; Aug. 82; Sep. 98, 113*, 117; Nov. 78, 89; Dec. 74
Kentucky-Utah Mining Co. .....Aug. 80
Kerr McGee Oil Industries .....Jan. 89, 95; Apr. 71; Sep. 106; Nov. 95*; Dec. 74
Key Chemical Co. .....Oct. 86
Key Tungsten, Inc. .....Oct. 83
Keystone Copper Corp. .....Feb. 96
Knob Hill Mines, Inc. .....Oct. 84
Kromona Mines Corp. .....Dec. 83

L & W Tungsten Co. .....Jun. 94
La Sal Mining Co. .....Jan. 92
Lava Cap Gold Mining Corp. .....Feb. 96
Lava Hot Springs Foundation .....Feb. 92
Lavender Uranium Corp. ....Jul. 96; Sep. 119
Leadville Lead & Uranium Corp. ....Sep. 115
Lisbon Uranium Corp. .....Apr. 70; Jun. 95; Aug. 80
Lithium Corp. of America ..Aug. 78; Sep. 87; Nov. 89; Dec. 80
Little Beaver Mining Co., Inc. .....Mar. 72, 83
Little Rockies Mining & Development Co. .....Nov. 94
Loma Uranium Co. .....Oct. 87
Lone Star Steel Co. .....Aug. 83
Lone Star Sulphur Corp. .....Aug. 83
Lookout Mountain Mining & Milling Co. ..Feb. 92; Apr. 73; Aug. 80; Oct. 82.
Los Ocho Mining Co. ..Sept. 113; Oct. 85; Nov. 85.
Lovitt Mining Co., Inc. .....Apr. 76
Luck Mining & Construction Co. ..Jun. 94; Oct. 90.
Lucky Friday Silver-Lead Mines ..Jan. 97; Feb. 91; Mar. 95; Apr. 73; Jul. 91; Aug. 85; Dec. 81.
Lucky Mc Uranium Corp. ..May 85; Jul. 96; Sept. 120; Nov. 88; Dec. 80.
Lucky Tex Uranium Co. .....Nov. 87
Lucky Tiger Co. .....Dec. 83
Lucky Nine Chrome Co. .....Jun. 90

MacArthur Mining Co. .....Oct. 92
Magic Uranium Co. .....Oct. 82
Maglia Mining Co. .....Feb. 95
Magnet Cove Co. .....Jul. 103
Magnet Cove Barium Co. ..Jan. 95; Aug. 77; Sept. 105.
Malheur Wonder Earth Co. ..Feb. 94; May 79
Mallory-Sharon Titanium Corp. .....Aug. 78
Manganese, Inc. .....Jan. 95; Mar. 91
Mascot Mines, Inc. .....Oct. 82; Dec. 79, 81
McFarland & Hullinger .....Dec. 80
Merger Mines Corp. .....Jan. 97; Sept. 109
Mesa Uranium Co. .....Nov. 85
Metallics, Unlimited .....May 80
Miami Copper Co. Jan. 93; Mar. 91; Aug. 82
Mid-Continent Mining Co. .....Oct. 92
Mifflin Mining Co. .....Jul. 97; Oct. 91*
Miller & McGee Manganese Corp. .....Oct. 91
Millers, Inc. .....Aug. 83
Mineral Mining Co. .....Jun. 92; Oct. 91
Minerals Engineering Co. ..Jan. 91, 97; Apr. 70; Jun. 89, 95, 96; Sept. 111; Oct. 84; Nov. 87
Minerals Leasing Co. .....Oct. 82
Minerals Mining & Milling Co. .....Oct. 85
Minerva Oil Co. ....Jan. 87; Apr. 71; Jun. 91
Miracle Mining Co. ..Sept. 105; Nov. 95; Dec. 33.
Mitchell Mining Co. ..May 79; Aug. 85; Sept. 112; Dec. 83.
Moab Land & Development Co. .....Sept. 118
Moab Uranium Co. .....Oct. 87; Dec. 79
Modoc Mining Co. .....Feb. 97
Mogul Mining Co. .....Nov. 98
Molybdenum Corp. of America ..May 66; Jul. 101; Sept. 105.
Monarch Mining Co. .....Oct. 83
Monarch Uranium Co. .....Oct. 85
Monsanto Chemical Co. ..May 79; Sept. 107, 111.
Montana American Uranium Mining Co. Feb. 93
Montana Gold & Chemical Co. .....Dec. 83
Montana Standard Mining Co. .....Jan. 100
Monterey Mining Co. .....Apr. 75
Monterey Uranium Corp. .....Oct. 85
W. S. Moore Co. ..Jan. 88; Mar. 88; Jul. 97; Oct. 92; Dec. 77.
Moreno Uranium Corp. .....Aug. 80
Morris Ravine Mining Co. .....Feb. 96
Moskol Leasing Co. .....Dec. 79
Moss Copper Mining Co. .....Sep. 119
Mother Lode Trust .....Nov. 94
Mother Lode Uranium Co. .....Oct. 85
Mount Peale Uranium Co. .....Oct. 85
Mountain States Uranium, Inc. .....Jun. 95
Mugwump Mining Co., Inc. .....Feb. 95

Naildriver Mining Co. .....Mar. 86
Nancy Hanks Mines, Inc. .....Sep. 112, Oct. 83
Nancy Lee .....Mar. 86; Jun. 96; Oct. 82
Nash Mines .....Jun. 93
National Distillers Products Corp. .....Oct. 91
National Explorations, Ltd. .....Jun. 96
National Gypsum Co. .....Oct. 67
National Industrial Products Corp. .....Oct. 84
National Lead Co. ..Apr. 55; May 61; Aug. 89; Sep. 119
National Silver Lead Mining Co. .....Feb. 92
National Steel Corp. .....Mar. 88
National Uranium Corp. ..Aug. 80; Oct. 82, 87; Nov. 88
National Zinc Co. .....Jan. 89; Apr. 71
Natomas Co. .....Feb. 96, 97
Needlegun Mine .....Nov. 94
Nellie Bly .....Dec. 79
Nevada-Massachusetts Co. .....Oct. 90
Nevada Mica Manufacturing Co. .....Jul. 105
Nevada Perlite Co. .....Jun. 94
Nevada Rawhide Mining Co. .....Jul. 105
Nevada Tungsten Corp. .....Feb. 97
Nevada Uranium Co. .....Aug. 81
New Era Mines, Inc. ..Feb. 92; Mar. 86; May 78; Jun. 96; Oct. 82
New Idria Mining & Chemical Co. ....Nov. 95
New Jersey Zinc Co. ....Jan. 87, 89, 95; Feb. 91, 92; Apr. 71; Aug. 77; Sep. 89, 98; Nov. 91; Dec. 68.
New-Mar Uranium Corp. .....Nov. 87
New Mexico Copper Corp. .....Nov. 101
New Mexico Exploration Co. .....Sep. 106
New Park Mining Co. ....Jan. 91; Mar. 93; Jul. 92, 96; Dec. 80
New Rainbow Mining Co. ....Aug. 85; Dec. 81
New Universe Uranium Co. .....Oct. 85
New World Exploration Co. .....Feb. 97
Newmont Exploration, Ltd. .....Dec. 80
Newmont Mining Corp. ....Feb. 25, 91, 92, 96; Dec. 67, 68
Nonmetallics, Inc. .....Jan. 100
North Fork Mining Co. .....Jul. 101; Sep. 109
North Range Mining Co. ....May 82; Aug. 78
Northwest Chemical & Refining Co. .....Feb. 94
Northwest Gold Fields, Co. .....Sep. 109
Northwest Gypsum Co. .....Feb. 92; Mar. 95
Northwest Magnesite Co. .....Jun. 90
Northwestern Portland Cement Co. .....Aug. 87
E. S. Nossen Laboratories, Inc. .....Jan. 87
Nuclear Magnetic Mining, Inc. .....Sep. 108

Oil, Inc. .....Jan. 91
Old Faithful Uranium Co. ....Sep. 120; Oct. 87
Oliver Iron Mining Division (U.S. Steel) ..Feb. 85; Mar. 88; May 82; Aug. 60; Nov. 91
Oom Paul Consolidated Mining Co. .....Jan. 97
Oro Fino Consolidated Mines, Inc. .....May 74
Oxford Uranium Corp. .....Dec. 81
Ozark-Mahoning Co. ..Jun. 91; Sep. 115; Nov. 89
Ozark Ore Co. .....May 81

P. M. T. Mining Co. .....Jun. 91
Pabco Products Co. .....Nov. 98
Pacific Isle Mining Co. .....Jan. 88; Oct. 92
Pacific Northern Minerals Co. .....Aug. 86
Pacific Northwest Alloys, Inc. .....Feb. 94
Palo Alto Uranium Co. .....Oct. 86
Pan-American Uranium Corp. .....Nov. 88
Paradox Uranium Mining Corp. .....Nov. 85
Park Copper & Gold Mining Co. .....Nov. 93
Pathfinder Uranium Corp. .....Oct. 85
Pend Oreille Mines & Metals Co. ..Mar. 71, 93, 96; Jul. 94; Dec. 83.
Penn-Texas Corp. .....Aug. 80
Penn-Uranium Corp. .....Aug. 80, 81
Penticton Tungsten Mines, Ltd. .....Nov. 94
Perry Minerals Co. .....Sep. 108
Phelps Dodge Corp. Feb. 95; Mar. 91; Aug. 81; Sep. 86
Pickands Mather & Co. ..Feb. 85; Mar. 88; Apr 72; Jun. 92; Jul. 97; Aug. 78; Sep. 107*; Oct. 92; Nov. 91; Dec. 77.
Pima Mining Co. .....Aug. 82; Nov. 37
Pine Creek Lead-Zinc Mining Co. .....Dec. 81
Pioneer Gold Dredging Co. .....Sep. 111
Pioneer Oil Co. .....May 85
Piquette Mining & Milling Co. .....Nov. 89
Piute Tungsten Mills, Inc. .....Feb. 96
Placers, Inc. .....Apr. 76
Plateau Mining Co. .....Aug. 80
Platora Uranium Corp. ..Jun. 93; Jul. 103; Sep. 105
Polaris Mining Co. ..Jan. 97; Mar. 93; Apr. 73; May 78; Jul. 91; Sep. 109; Oct. 83; Nov. 93; Dec. 81
Pony Tungsten Enterprise Co. .....Sep. 111
Porter Brothers Corp. .....Sep. 109
Potash Chemical Co. .....Aug. 80
Potash Company of America ..May 35; Nov. 101
Primitive Exploration & Finding Co. ..Jul. 93; Oct. 83; Nov. 93
Providence Mining Co. .....Mar. 87
Pumpelly Mining Industry .....Jun. 93

Queen Mining Syndicate .....Feb. 93

Radon Research Corp. .....Jan. 93; Aug. 85
Rainbow Mining & Milling Co. .....Jun. 89
Relief Hill Mining Group .....Feb. 96

Republic Steel Corp. ..Feb. 25; Mar. 88; Apr. 58; Jun. 45, 75, 91; Oct. 72, 92
Rescue Mining Co. .....Jun. 89
Reserve Mining Co. ..Jan. 88; Feb. 85; Apr. 71; Jun. 91*; Nov. 91
Resurrection Mining Co. .....Feb. 87
Reynolds Metals Co. .....Oct. 67
Rhude & Fryberger .....Jan. 88; Mar. 88
Rico Argentine Mining Co. ..Jan. 93; Aug. 79; Nov. 85; Dec. 79
Riviera Mines Co. .....Aug. 81, 82
Roaring Creek Mining Co. .....Nov. 88
Robb & Westfall .....Jun. 90
Rocky Mountain Cooperative Prospecting ..Sep. 109
Rosebud Mines .....Jul. 93
Rosiclare Lead & Fluorspar Mining Co. ..Jun. 91; Jul. 97; Aug. 77
Ruby Co. .....Jan. 92
J. W. Rupert Drilling Co. .....Apr. 70; Jul. 96

Sabinesa Exploration Development Co. ..Oct. 90
St. Joseph Lead Co. ..Mar. 71; Apr. 71; Jun. 91; Jul. 97
Salero Metals Corp. .....Aug. 82
Salmon River Scheelite Corp. ..Aug. 85; Nov. 93
Salt Lake Tungsten Co. ..Jan. 91, 97; Jun. 90; Oct. 84
San Francisco Chemical Co. .....Aug. 79*
San Juan Mining & Developing Co. ....Sep. 115
San Juan Mining Corp. .....Jun. 95
San Juan Uranium Exploration Co. .....Jan. 91
San Manuel Copper Corp. .....Jul. 99
Santa Fe Uranium Corp. .....Dec. 75
Sateco Uranium Co. ..Sep. 120; Oct. 87; Nov. 85
Scheel Olivine, Inc. .....Nov. 94
Schroeder Mining Co. .....Feb. 87; Nov. 91
Seagull Uranium Corp. .....Oct. 85
Shannon Mining Co. .....Aug. 81*; Dec. 75
Shattuck Denn Mining Co. ....Mar. 84; May 76
Shenandoah-Dives Mining Co. .....Aug. 79
Sherman Valley Manganese Co. .....Oct. 92
Shiprock Uranium Corp. .....Oct. 90
Sidney Mining Co. ..Mar. 93; May 78; Jul. 91; Nov. 93
Sierra Uranium Co. .....Jul. 105
Signal .....Mar. 86; Jun. 96; Oct. 82
Silver Bell Mines Co. .....Oct. 85
Silver Bowl .....Mar. 86; Jun. 96; Oct. 82
Silver Buckle Mining Co. ..Feb. 91; Mar. 93, 95; Jul. 92; Sep. 118; Oct. 87; Nov. 88; Dec. 80
Silver-Crescent, Inc. .....Jan. 100
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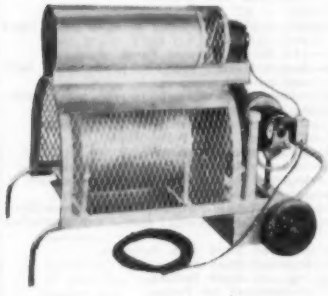

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Northwest News

(*Continued from page* 83)

vation. A new air trammer now is in use. Joe F. Krom of Seattle is president.

Alder Gold-Copper Company is undertaking a copper exploration and development program at its property near Twisp, Okanogan County, Washington. Work will be under an area which has yielded considerable copper production in past years. Mill operations are due to resume when at least a six months' copper ore supply is on hand. The firm's 300-ton concentrator and mine were shut down a year ago due to the low price of zinc, principal metal being produced. E. Royce of Portland is president.

Conconully Mines Inc. is shipping concentrates to the Helena, Montana smelter of ASARCO. The concentrates are made in a leased flotation mill near Omak, Okanogan County, Washington. Ore containing copper, lead, silver, and zinc is mined from claims in the Peacock Mountain and Mineral Hill areas of the nearby Conconully mining district. Efforts are being made to develop sufficient ore to keep the mill operating throughout the winter. Seventy-five tons a day are needed. A. E. Kaiser is resident manager.

The old Deer Trail flotation plant east of Fruitland, southwestern Stevens County, Washington has been enlarged and modernized by *Alpine Uranium Corporation* of Salt Lake City, Utah at a cost of about $60,000. Daily capacity has been upped from about 30 tons to 125 tons. A silver circuit has been replaced by copper and cobalt circuits. New equipment includes an International Diesel 125-kva electric generator, a Universal Cedar Rapids crusher, Pioneer conveyor system, Jeffrey vibrating feeder, Symons crusher, and Dorr rake classifier. An Allis-Chalmers ball mill has been reconditioned, along with 10 flotation cells. Four new Fahrenwald cleaner cells have been installed. A 90-ton primary ore bin and a 180-ton secondary bin have been built. Initial mill feed will come from dumps of the old Turk mine and a 1½-mile haulage road has been constructed. Custom ores also will be accepted. Adrian W. Cannon of Salt Lake City is president, and J. W. Lower, resident manager and engineer.

The old *Togo* copper mine near Fruitland, Stevens County, Washington is being reopened by Harvey E. Gray, earth-moving contractor, who has leased the property. He used a bulldozer and dragline to reopen the caved portal. He plans to have Togo ore custom-milled at the nearby Deer Trail concentrator.

Tri-County Mining Association, in annual convention at Grand Coulee, Washington (Oct. 1-2) urged reopening of Colville Indian reservation lands for mineral development. The resolution charged that the lands were withdrawn illegally by Former Interior Secretary Harold L. Ickes. Another resolution called for a dollar freely convertible at a ratio for gold which would be determined by a realistic revaluation of gold with the dollar at its present stage of depreciation. Still another urged that the trade agreements act of 1934 be allowed to expire next June. Mayor Clyde McLain of Grand Coulee was elected president to succeed C. A. Gray of Spokane. Mrs. Ruth Meiner, Grand Coulee, was elected secretary. The 1955 meeting was scheduled for September 30 and October 1.

Pacific Northwest Alloys, Inc. of Mead, Washington has contracted with the General Services Administration for the purchase of two stockpiles of chromite remaining from World War II operations. The company will upgrade the ore from its present state of 25.3 percent chrome to ore that is about 40 percent chrome. A special beneficiating plant is planned with Coquille, Oregon as the site. The upgraded concentrate will then be shipped to Mead for further processing into low-carbon ferrochrome.

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4—10 ton Atlas battery, 36" gauge
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Membership of the University Institutions Provident Fund is compulsory and involves a contribution of 7% of the pensionable salary, the Government and the University together contributing an equal amount.

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The Professor will be called upon as part of his duties to serve as a Consultant to the Transvaal and Orange Free State Chamber of Mines. He will not, except under special circumstances, be granted permission to engage in private consultative work.

Duties are to be assumed on the 1st July, 1955, or as soon as possible thereafter. Applicants are advised to obtain the information sheet giving more details in regard to this vacancy from the Registrar, University, Milnar Park, Johannesburg, South Africa, with whom Applications should be lodged not later than 31st January, 1955.

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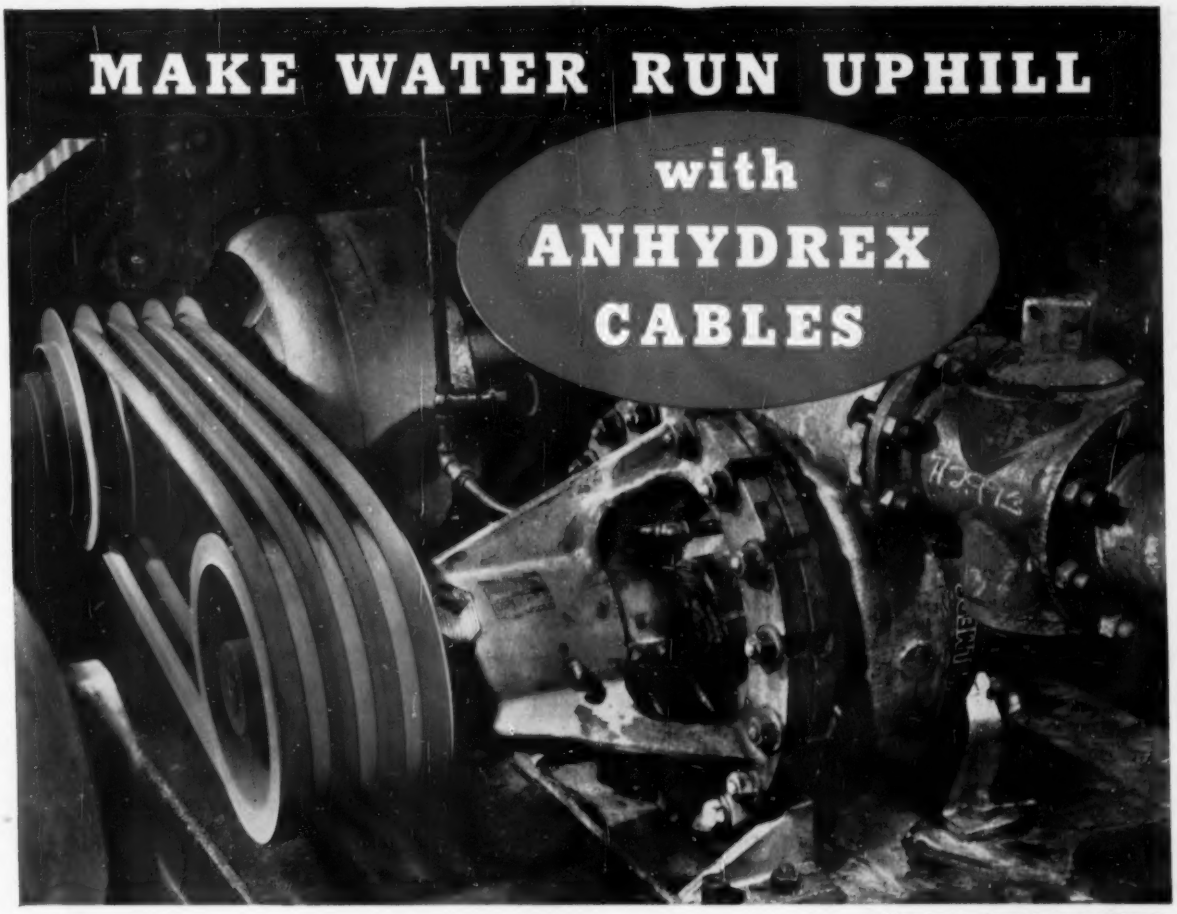

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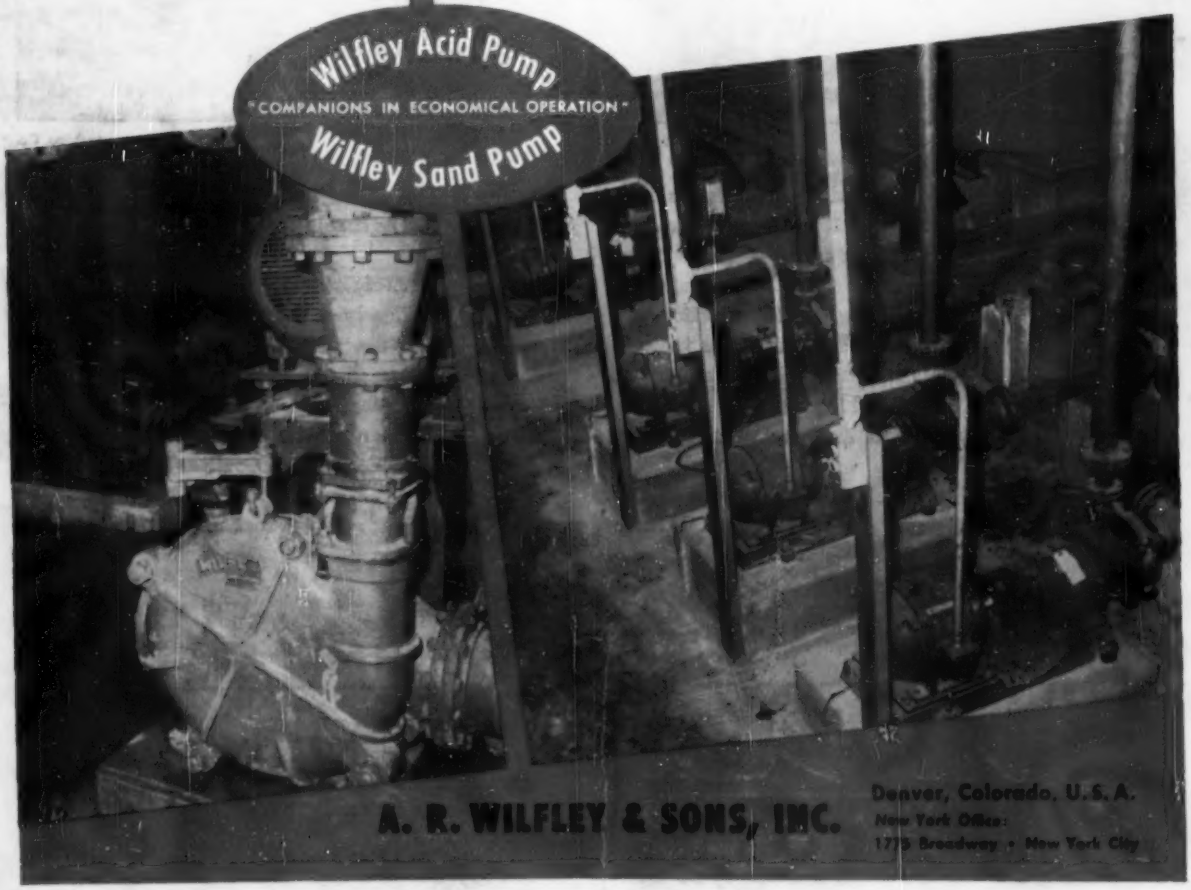

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